```
=> fil hcap
FILE 'HCAPLUS' ENTERED AT 16:00:42 ON 27 FEB 2006
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FILE COVERS 1907 - 27 Feb 2006  VOL 144 ISS 10
FILE LAST UPDATED: 26 Feb 2006  (20060226/ED)

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=> d his ful

     (FILE 'HOME' ENTERED AT 15:14:16 ON 27 FEB 2006)

     FILE 'HCAPLUS' ENTERED AT 15:14:29 ON 27 FEB 2006
                E US6399231/PN
L1            1 SEA US6399231/PN
                D TI
                D IALL
                SEL RN

     FILE 'REGISTRY' ENTERED AT 15:15:55 ON 27 FEB 2006
L2            3 SEA (1333-74-0/BI OR 7440-06-4/BI OR 7782-44-7/BI)
                D SCA

     FILE 'WPIX' ENTERED AT 15:23:20 ON 27 FEB 2006
                E US6399231/PN
L3            1 SEA US6399231/PN
                D IFULL

     FILE 'HCAPLUS' ENTERED AT 15:31:00 ON 27 FEB 2006
L4        59349 SEA FUEL(W)CELL#
L5         5517 SEA PROTON(W)EXCHANGE(W)MEMBRANE# OR PEM
L6        18094 SEA (RESTORE# OR RESTORING OR REGENERAT? OR RE(W)(STORE#
                OR STORING OR GENERAT?))(5A)CELL#
L7         3909 SEA L4 AND L5
L8           66 SEA L7 AND L6
L9           25 SEA L8 AND P/DT
L10           7 SEA L9 AND (1907-2000)/PRY,AY
L11          41 SEA L8 NOT L9
L12          24 SEA L11 NOT (2000-2006)/PY
L13          31 SEA L10 OR L12
L14      161952 SEA (NEGATIVE OR NEG#)(A)ELECTRODE# OR ANODE#
L15      199588 SEA (POSITIVE OR POS#)(A)ELECTRODE# OR CATHODE#
L16           4 SEA L13 AND L14
L17           7 SEA L13 AND L15
L18           8 SEA L16 OR L17
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L19          31 SEA L13 OR L18

     FILE 'WPIX' ENTERED AT 15:48:58 ON 27 FEB 2006
L20       34503 SEA FUEL(W)CELL#
L21        1411 SEA PROTON(W)EXCHANGE(W)MEMBRANE# OR PEM
L22        4540 SEA (RESTORE# OR RESTORING OR REGENERAT? OR RE(W)(STORE#
                OR STORING OR GENERAT?))(5A)CELL#
L23        1201 SEA L20 AND L21
L24          29 SEA L23 AND L22
L25      120426 SEA (NEGATIVE OR NEG#)(A)ELECTRODE# OR ANODE#
L26      150002 SEA (POSITIVE OR POS#)(A)ELECTRODE# OR CATHODE#
L27          14 SEA L24 AND L25
L28          15 SEA L24 AND L26
L29          16 SEA L27 OR L28

     FILE 'COMPENDEX' ENTERED AT 15:51:43 ON 27 FEB 2006
L30       16089 SEA FUEL(W)CELL#
L31        2967 SEA PROTON(W)EXCHANGE(W)MEMBRANE# OR PEM
L32        1065 SEA (RESTORE# OR RESTORING OR REGENERAT? OR RE(W)(STORE#
                OR STORING OR GENERAT?))(5A)CELL#
L33        2113 SEA L30 AND L31
L34          39 SEA L33 AND L32
L35       27299 SEA (NEGATIVE OR NEG#)(A)ELECTRODE# OR ANODE#
L36       41673 SEA (POSITIVE OR POS#)(A)ELECTRODE# OR CATHODE#
L37           3 SEA L34 AND L35
L38           3 SEA L34 AND L36
L39           5 SEA L37 OR L38

     FILE 'JAPIO' ENTERED AT 15:53:01 ON 27 FEB 2006
L40       20800 SEA FUEL(W)CELL#
L41         113 SEA PROTON(W)EXCHANGE(W)MEMBRANE# OR PEM
L42         506 SEA (RESTORE# OR RESTORING OR REGENERAT? OR RE(W)(STORE#
                OR STORING OR GENERAT?))(5A)CELL#
L43          76 SEA L40 AND L41
L44           0 SEA L43 AND L42

     FILE 'JICST-EPLUS' ENTERED AT 15:54:19 ON 27 FEB 2006
L45        8807 SEA FUEL(W)CELL#
L46         311 SEA PROTON(W)EXCHANGE(W)MEMBRANE# OR PEM
L47        1904 SEA (RESTORE# OR RESTORING OR REGENERAT? OR RE(W)(STORE#
                OR STORING OR GENERAT?))(5A)CELL#
L48         126 SEA L45 AND L46
L49           0 SEA L48 AND L47

     FILE 'INSPEC' ENTERED AT 15:55:00 ON 27 FEB 2006
L50       12481 SEA FUEL(W)CELL#
L51        3184 SEA PROTON(W)EXCHANGE(W)MEMBRANE# OR PEM
L52         796 SEA (RESTORE# OR RESTORING OR REGENERAT? OR RE(W)(STORE#
                OR STORING OR GENERAT?))(5A)CELL#
L53        2400 SEA L50 AND L51
L54          39 SEA L53 AND L52
L55       25665 SEA (NEGATIVE OR NEG#)(A)ELECTRODE# OR ANODE#
L56       50833 SEA (POSITIVE OR POS#)(A)ELECTRODE# OR CATHODE#
L57           3 SEA L54 AND L55
L58           2 SEA L54 AND L56
L59           5 SEA L57 OR L58

     FILE 'WPIX' ENTERED AT 15:56:24 ON 27 FEB 2006
                SEL L29 PN,APPS

     FILE 'HCAPLUS' ENTERED AT 15:57:06 ON 27 FEB 2006
L60          19 SEA (WO2001-US30557/APPS OR US2001-965444/APPS OR
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L61          29 SEA L19 NOT L60

     FILE 'HCAPLUS, COMPENDEX, INSPEC' ENTERED AT 15:59:21 ON 27 FEB 2006
L62          34 DUP REM L61 L39 L44 L49 L59 (5 DUPLICATES REMOVED)

     FILE 'HCAPLUS' ENTERED AT 16:00:42 ON 27 FEB 2006
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FILE HOME

FILE HCAPLUS

FILE COVERS 1907 - 27 Feb 2006 VOL 144 ISS 10
FILE LAST UPDATED: 26 Feb 2006 (20060226/ED)

New CAS Information Use Policies, enter HELP USAGETERMS for details.

This file contains CAS Registry Numbers for easy and accurate
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FILE REGISTRY
Property values tagged with IC are from the ZIC/VINITI data file
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STRUCTURE FILE UPDATES: 26 FEB 2006 HIGHEST RN 875270-69-2
DICTIONARY FILE UPDATES: 26 FEB 2006 HIGHEST RN 875270-69-2

New CAS Information Use Policies, enter HELP USAGETERMS for details.

TSCA INFORMATION NOW CURRENT THROUGH January 6, 2006

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conducting SmartSELECT searches.

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*******************************************************************
*
* The CA roles and document type information have been removed from
* the IDE default display format and the ED field has been added,
* effective March 20, 2005. A new display format, IDERL, is now
* available and contains the CA role and document type information.
*
*******************************************************************
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Structure search iteration limits have been increased. See HELP SLI
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REGISTRY includes numerically searchable data for experimental and
predicted properties as well as tags indicating availability of
experimental property data in the original document. For informatio
on property searching in REGISTRY, refer to:

http://www.cas.org/ONLINE/UG/regprops.html

FILE STNGUIDE
FILE CONTAINS CURRENT INFORMATION.
LAST RELOADED: Feb 24, 2006 (20060224/UP).

FILE WPIX
FILE LAST UPDATED: 24 FEB 2006 <20060224/UP>
MOST RECENT DERWENT UPDATE: 200613 <200613/DW>
DERWENT WORLD PATENTS INDEX SUBSCRIBER FILE, COVERS 1963 TO DATE

>>> FOR A COPY OF THE DERWENT WORLD PATENTS INDEX STN USER GUIDE,
PLEASE VISIT:
http://www.stn-international.de/training_center/patents/stn_guide.p

>>> FOR DETAILS OF THE PATENTS COVERED IN CURRENT UPDATES, SEE
http://scientific.thomson.com/support/patents/coverage/latestupdates

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GUIDES, PLEASE VISIT:
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DOCUMENTATION NOW AVAILABLE IN DERWENT WORLD PATENTS INDEX
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FOR FURTHER DETAILS:
http://scientific.thomson.com/support/products/dwpifv/

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PLEASE CHECK:
http://scientific.thomson.com/support/patents/dwpiref/reftools/class

>>> PLEASE BE AWARE OF THE NEW IPC REFORM IN 2006, SEE
http://www.stn-international.de/stndatabases/details/ipc_reform.html
http://scientific.thomson.com/media/scpdf/ipcrdwpi.pdf <<<

FILE COMPENDEX
FILE LAST UPDATED: 27 FEB 2006 <20060227/UP>
FILE COVERS 1970 TO DATE.

<<< SIMULTANEOUS LEFT AND RIGHT TRUNCATION AVAILABLE IN
THE BASIC INDEX >>>

FILE JAPIO
FILE COVERS APR 1973 TO OCTOBER 27, 2005

>>> GRAPHIC IMAGES AVAILABLE <<<

>>> NEW IPC8 DATA AND FUNCTIONALITY NOT YET AVAILABLE IN THIS FILE.
USE IPC7 FORMAT FOR SEARCHING THE IPC. WATCH THIS SPACE FOR FURT
DEVELOPMENTS AND SEE OUR NEWS SECTION FOR FURTHER INFORMATION
ABOUT THE IPC REFORM <<<

FILE JICST-EPLUS
FILE COVERS 1985 TO 20 FEB 2006 (20060220/ED)

THE JICST-EPLUS FILE HAS BEEN RELOADED TO REFLECT THE 1999 CONTROLLE
TERM (/CT) THESAURUS RELOAD.

FILE INSPEC
FILE LAST UPDATED: 20 FEB 2006 <20060220/UP>
FILE COVERS 1969 TO DATE.

```
<<< SIMULTANEOUS LEFT AND RIGHT TRUNCATION AVAILABLE IN
    THE ABSTRACT (/AB), BASIC INDEX (/BI) AND TITLE (/TI) FIELDS  >>

<<< INSPEC HAS BEEN RELOADED AND ENHANCED --> SEE NEWS
    AND HELP CHANGE  >>>

=> d l29 que stat
L20        34503 SEA FILE=WPIX FUEL(W)CELL#
L21         1411 SEA FILE=WPIX PROTON(W)EXCHANGE(W)MEMBRANE# OR PEM
L22         4540 SEA FILE=WPIX (RESTORE# OR RESTORING OR REGENERAT? OR
                 RE(W)(STORE# OR STORING OR GENERAT?))(5A)CELL#
L23         1201 SEA FILE=WPIX L20 AND L21
L24           29 SEA FILE=WPIX L23 AND L22
L25       120426 SEA FILE=WPIX (NEGATIVE OR NEG#)(A)ELECTRODE# OR ANODE#
L26       150002 SEA FILE=WPIX (POSITIVE OR POS#)(A)ELECTRODE# OR
                 CATHODE#
L27           14 SEA FILE=WPIX L24 AND L25
L28           15 SEA FILE=WPIX L24 AND L26
L29           16 SEA FILE=WPIX L27 OR L28


=> fil wpix
FILE 'WPIX' ENTERED AT 16:15:36 ON 27 FEB 2006
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=> d l29 ifull hitstr 1-16

L29  ANSWER 1 OF 16  WPIX  COPYRIGHT 2006 THE THOMSON CORP on STN
ACCESSION NUMBER:      2005-616324 [63]   WPIX
CROSS REFERENCE:       2004-450549 [42]; 2004-552000 [53]; 2005-242585
                       [25]; 2005-242586 [25]; 2005-262794 [27]
DOC. NO. NON-CPI:      N2005-505770
DOC. NO. CPI:          C2005-185413
TITLE:                 Balance-of-plant system for regulating operation of
                       electrolyzer cell stack module, comprises second
                       pressure regulator for regulating second pressure
                       of second reaction product relative to first
                       pressure using signal from pressure sensor.
DERWENT CLASS:         J03 X16 X25
INVENTOR(S):           FRANK, D; JOOS, N I; RUSTA-SALLEHY, A; VALE, M
PATENT ASSIGNEE(S):    (FRAN-I) FRANK D; (JOOS-I) JOOS N I; (RUST-I)
                       RUSTA-SALLEHY A; (VALE-I) VALE M
COUNTRY COUNT:         1
PATENT INFORMATION:
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PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
US 2005186458	A1	20050825	(200563)*		19	H01M008-04

APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
US 2005186458	A1 Provisional	US 2003-504227P	20030922
		US 2004-945492	20040921

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PRIORITY APPLN. INFO: US 2003-504227P      20030922; US
                      2004-945492      20040921
INT. PATENT CLASSIF.:
          MAIN:       H01M008-04
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SECONDARY: C25B015-02

BASIC ABSTRACT:

US2005186458 A UPAB: 20051003

NOVELTY - A balance-of-plant system comprises a pressure following device having a pressure sensor for measuring a first pressure and providing a signal including information about a value of the first pressure; and a second pressure regulator for regulating a second pressure of a second reaction product relative to the first pressure using the signal from the pressure sensor.

DETAILED DESCRIPTION - A balance-of-plant system for regulating the operation of an electrolyzer cell stack having an electrolyzer cell comprises a first pressure regulator for regulating a first pressure of a first reaction product; and a pressure following device having a pressure sensor for measuring the first pressure and providing a signal including information about a value of the first pressure; and a second pressure regulator for regulating a second pressure of a second reaction product relative to the first pressure using the signal from the pressure sensor.

USE - Used for regulating the operation of an electrolyzer cell stack module (claimed), e.g. for use with **proton exchange membrane (PEM)** electrolyzer cells, solid polymer water electrolyzers (SPWE), alkaline **fuel cells** (AFC), direct methanol **fuel cells** (DMFC), molten carbonate **fuel cells** (MCFC), phosphoric acid **fuel cells** (PAFC), solid oxide **fuel cells** (SOFC) or **regenerative fuel cells** (RFC).

ADVANTAGE - The balance-of-plant system reduces production costs of electrochemical cells.

DESCRIPTION OF DRAWING(S) - The figure is a schematic view of an electrolyzer cell module.

Cell module 10a

Electrical connections 12, 13

Outlet ports 27, 28

Inlet port 204

Dwg.2/7

TECHNOLOGY FOCUS:

US 2005186458 A1UPTX: 20051003

TECHNOLOGY FOCUS - ELECTRICAL POWER AND ENERGY - Preferred Component: The first and second pressures correspond to pressures on respective **anode** and **cathode** sides of the electrolyzer cell.

TECHNOLOGY FOCUS - MECHANICAL ENGINEERING - Preferred Component: The balance-of-plant system further comprises a hydrogen collection device; and an oxygen collection device. The pressure sensor is operable to measure/sense the oxygen pressure and the second pressure regulator is operable to set the hydrogen pressure. It is connectable to measure the oxygen pressure between the electrolyzer cell stack and the oxygen collection device. The second pressure regulator is one of a negative bias pressure regulator and a positive bias pressure regulator.

FILE SEGMENT: CPI EPI

FIELD AVAILABILITY: AB; GI

MANUAL CODES: CPI: J03-B
EPI: X16-C09; X25-R01A

L29 ANSWER 2 OF 16 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN

ACCESSION NUMBER: 2005-405207 [41] WPIX

DOC. NO. NON-CPI: N2005-328835

DOC. NO. CPI: C2005-125029

TITLE: Catalyst useful e.g. as **anode** in

electrolysis of water, in electrochemical devices, **fuel cells** comprises iridium oxide and inorganic oxide having specific BET surface area.

DERWENT CLASS: D15 E36 J03 J04 L03 X25
INVENTOR(S): BIBERBACH, P; LOPEZ, M; SCHLEUNUNG, A
PATENT ASSIGNEE(S): (UMIC-N) UMICORE & CO AG KG
COUNTRY COUNT: 108
PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
WO 2005049199	A1	20050602	(200541)*	EN	16	B01J023-46

RW: AT BE BG BW CH CY CZ DE DK EA EE ES FI FR GB GH GM GR HU IE IT KE LS LU MC MW MZ NA NL OA PL PT RO SD SE SI SK SL SZ TR TZ UG ZM ZW

W: AE AG AL AM AT AU AZ BA BB BG BR BW BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE EG ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NA NI NO NZ OM PG PH PL PT RO RU SC SD SE SG SK SL SY TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW

APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
WO 2005049199	A1	WO 2004-EP12290	20041029

PRIORITY APPLN. INFO: DE 2003-10350563 20031029
INT. PATENT CLASSIF.:
MAIN: B01J023-46
SECONDARY: C02F001-461; C25B001-10; C25B011-04; H01M004-92; H01M008-18

BASIC ABSTRACT:

WO2005049199 A UPAB: 20050629

NOVELTY - A catalyst (C1) comprises iridium oxide and an inorganic oxide (less than 20 wt.%) having BET surface area of 50 - 400 m2/g.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is included for manufacture of the catalyst involving:

(1) dissolving the iridium and optionally a ruthenium precursor compound in the presence of an inorganic oxide in an aqueous solution;

(2) precipitating the iridium oxide (optionally in combination with the ruthenium oxide) by adjusting the pH of the mixture to 6 - 10;

(3) separating and drying the catalyst; and

(4) heating the catalyst at 300-800 deg. C.

USE - As **anode** catalysts in electrodes, catalyst-coated membranes and membrane electrode assemblies for polymer electrolyte membrane water electrolyzers, in **regenerative fuel cells**, sensors, electrolytes and other electrochemical devices (claimed).

ADVANTAGE - The catalyst reveals a low oxygen overvoltage, it enables very low precious metal loadings and can be manufactured in environmentally safe processes. The catalysts have a long lifetime and enable a high endurance of the **PEM** electrolyzer unit.

Dwg.0/0

TECHNOLOGY FOCUS:

WO 2005049199 A1UPTX: 20050629

TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - Preferred Catalyst: The catalyst further comprises ruthenium oxide in an amount resulting in

an iridium/ruthenium-atomic ratio of 4/1 - 1/4. The water solubility of the inorganic oxide is lower than 0.15 (preferably 0.05) g/l at 20 degrees C. The iridium oxide comprises iridium (IV) and/or iridium (III) oxide.
Preferred Components: The inorganic oxide is selected from titania, silica, alumina, zirconia, tin dioxide, ceria, niobium pentoxide and/or tantalum pentoxide.

EXTENSION ABSTRACT:
WO 2005049199 A1UPTX: 20050629
EXAMPLE - Iridium oxide/titanium dioxide catalyst was prepared as follows: titanium dioxide (378.8 mg) was added to deionized water (112.5 ml) with vigorous stirring and to it, hexachloroiridium acid solution (29.7 g) was added under stirring. The solution was diluted with deionized water and was heated to 70 degrees C. 0.1 M sodium hydroxide was added and was then diluted with 500 ml of deionized water. pH was adjusted to 7 by using 10 wt.% NaOH and the solution was kept for 4 hours at the same level. The product formed was filtered, washed and dried. The product was calcined at 400 degrees C in box oven in air to give iridium oxide/titanium dioxide catalyst. Another iridium oxide catalyst (comparative) without inorganic oxide was prepared similarly. The test/comparative catalyst showed an onset-potential for the oxygen evolution of 1.47/1.65 V; current density at 1.5 V vs.NHE of 1.48/0.23 mA/mg and BET surface are of 66/37 m2/g respectively.

FILE SEGMENT: CPI EPI
FIELD AVAILABILITY: AB; DCN
MANUAL CODES: CPI: D04-A01F1; D04-A01M; E31-A02; E31-D01; J03-B01; J04-E04; L03-E04B
EPI: X25-H03; X25-R01B

L29 ANSWER 3 OF 16 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN
ACCESSION NUMBER: 2005-262792 [27] WPIX
CROSS REFERENCE: 2005-262791 [27]
DOC. NO. NON-CPI: N2005-215788
DOC. NO. CPI: C2005-083151
TITLE: Electrolyzer cell, e.g. **proton exchange membrane** electrolyzer cell, includes **anode** flow field plate, **cathode** flow field plate, electrolyte layer, and pair of screens having openings and is electrically conductive.
DERWENT CLASS: E36 J03 L03 X16 X25
INVENTOR(S): FRANK, D; JOOS, N I
PATENT ASSIGNEE(S): (FRAN-I) FRANK D; (JOOS-I) JOOS N I; (HYDR-N) HYDROGENICS CORP
COUNTRY COUNT: 108
PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
WO 2005028710	A1	20050331	(200527)*	EN	45	C25B009-06
US 2005115825	A1	20050602	(200537)			C25B009-08

WO 2005028710 designated states:
RW: AT BE BG BW CH CY CZ DE DK EA EE ES FI FR GB GH GM GR HU IE IT KE LS LU MC MW MZ NA NL OA PL PT RO SD SE SI SK SL SZ TR TZ UG ZM ZW
W: AE AG AL AM AT AU AZ BA BB BG BR BW BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE EG ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NA NI NO NZ OM PG PH PL PT RO RU SC SD SE SG SK SL SY TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW

APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
WO 2005028710	A1	WO 2004-CA1708	20040920
US 2005115825	A1 Provisional	US 2003-504220P	20030922
	Provisional	US 2003-504223P	20030922
		US 2004-944835	20040921

PRIORITY APPLN. INFO: US 2003-504223P 20030922; US 2003-504220P 20030922; US 2004-944835 20040921

INT. PATENT CLASSIF.:
MAIN: C25B009-06; C25B009-08
SECONDARY: C25B011-03

BASIC ABSTRACT:
WO2005028710 A UPAB: 20050613
NOVELTY - An electrolyzer cell comprises an **anode** flow field plate (512), a **cathode** flow field plate (513), an electrolyte layer arranged between the **anode** and **cathode** flow field plates, and first and second screens (516, 517) arranged between the **anode** flow field plate and the electrolyte layer, where each of the screens has a respective number of openings and is electrically conductive.

USE - The invention is used as, e.g. **proton exchange membrane** electrolyzer cell, solid polymer water electrolyzers, alkaline **fuel cells**, direct methanol **fuel cells**, molten carbonate **fuel cells**, phosphoric acid **fuel cells**, solid oxide **fuel cells**, and **regenerative fuel cells.**

ADVANTAGE - The invention allows water to be uniformly distributed across an active surface of the electrolyte layer thus providing a more uniform reaction rate over the active area of the electrolyte layer.

DESCRIPTION OF DRAWING(S) - The figure shows an enlarged simplified sectional view of the electrolyzer cell.
Anode flow field plate 512
Cathode flow field plate 512
Screens (522, 523) Flow channels 516, 517
Dwg.5/7

TECHNOLOGY FOCUS:
WO 2005028710 A1UPTX: 20050427
TECHNOLOGY FOCUS - ELECTRICAL POWER AND ENERGY - Preferred Component: At least one of the **anode** flow field plate and the **cathode** flow field plate comprises manifold apertures; and a flow field, fluidly connecting two of the manifold apertures, having open-faced flow channels (522, 523) that are all substantially the same length and arranged to uniformly distribute both a first process gas/fluid and heat produced by an electrochemical reaction involving the first process gas/fluid over an area covered by the flow field.
Preferred Dimension: The size of the openings of the first screen is 0.004-0.025 inch. The size of the openings of the second screen is 0.02-0.04 inch. The thickness of the first screen is at most 0.003 inches. The thickness of the second screen is at most 0.01 inches. A maximum dimension of the openings of the first screen is approximately 0.017 inches. A maximum dimension of the openings of the second screen is approximately 0.0254 inches. The spacing between the openings of the second screen is at most 0.01 inches.

FILE SEGMENT: CPI EPI
FIELD AVAILABILITY: AB; GI; DCN

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MANUAL CODES:          CPI: E10-E04E1; E10-E04L1; E11-N; E31-A02; E31-A03;
                            E31-D01; E31-D02; E31-K02; E31-K05A; E31-N05D;
                            J03-B02; L03-E04
                       EPI: X16-C; X25-R01A; X25-R01C

L29  ANSWER 4 OF 16  WPIX  COPYRIGHT 2006 THE THOMSON CORP on STN
ACCESSION NUMBER:      2005-262791 [27]   WPIX
CROSS REFERENCE:       2005-262792 [27]
DOC. NO. NON-CPI:      N2005-215787
DOC. NO. CPI:          C2005-083150
TITLE:                 Flow field plate for electrochemical cell, e.g.
                       proton exchange membrane
                       electrolyzer cells, includes flow field fluidly
                       connecting two of manifold apertures and having
                       open-faced flow channels that are all the same
                       length.
DERWENT CLASS:         E36 J03 X16 X25
INVENTOR(S):           FRANK, D; JOOS, N I
PATENT ASSIGNEE(S):    (FRAN-I) FRANK D; (JOOS-I) JOOS N I; (HYDR-N)
                       HYDROGENICS CORP
COUNTRY COUNT:         108
PATENT INFORMATION:

     PATENT NO      KIND DATE     WEEK     LA   PG MAIN IPC
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     WO 2005028709    A1 20050331 (200527)* EN   52 C25B009-06
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            IT KE LS LU MC MW MZ NA NL OA PL PT RO SD SE SI SK SL SZ TR
            TZ UG ZM ZW
         W: AE AG AL AM AT AU AZ BA BB BG BR BW BY BZ CA CH CN CO CR CU
            CZ DE DK DM DZ EC EE EG ES FI GB GD GE GH GM HR HU ID IL IN
            IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW
            MX MZ NA NI NO NZ OM PG PH PL PT RO RU SC SD SE SG SK SL SY
            TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW
     US 2005260482    A1 20051124 (200577)          H01M008-02

APPLICATION DETAILS:

     PATENT NO      KIND                  APPLICATION        DATE
     -----------------------------------------------------------------
     WO 2005028709  A1                    WO 2004-CA1704     20040920
     US 2005260482  A1 Provisional        US 2003-504220P    20030922
                       Provisional        US 2003-504223P    20030922
                                          US 2004-944834     20040921

PRIORITY APPLN. INFO: US 2003-504223P      20030922; US
                      2003-504220P      20030922; US
                      2004-944834       20040921
INT. PATENT CLASSIF.:
         MAIN:        C25B009-06; H01M008-02
      SECONDARY:      H01M008-04; H01M008-24
BASIC ABSTRACT:
     WO2005028709 A UPAB: 20051130
     NOVELTY - A flow field plate comprises a front surface and a rear
     surface, manifold apertures (156-161), and a flow field fluidly
     connecting two of the manifold apertures and having open-faced flow
     channels that are all the same length.
          DETAILED DESCRIPTION - A flow field plate comprises:
          (1) a front surface and a rear surface;
          (2) manifold apertures; and
          (3) a flow field, on the front surface, fluidly connecting two
```

of the manifold apertures, having open-faced flow channels that are all substantially the same length and arranged to uniformly distribute both a first process gas/fluid and heat produced by an electrochemical reaction involving the first process gas/fluid over an area covered by the flow field on the front surface of the flow field plate.

USE - The invention is used for an electrochemical cell (claimed), e.g. **proton exchange membrane** electrolyzer cells, solid polymer water electrolyzers, alkaline **fuel cells**, direct methanol **fuel cells**, molten carbonate **fuel cells**, phosphoric acid **fuel cells**, solid oxide **fuel cells**, and **regenerative fuel cells.**

ADVANTAGE - The invention distributes heat more uniformly across an active surface of the flow filed plate, thus providing a more uniform reaction rate.

DESCRIPTION OF DRAWING(S) - The figure shows a front surface of a **cathode** flow field plate.

Manifold apertures 156-161

Dwg.4/5

TECHNOLOGY FOCUS:

WO 2005028709 A1UPTX: 20050427

TECHNOLOGY FOCUS - ELECTRICAL POWER AND ENERGY - Preferred Component: The open-faced channels include, in sequence, a first straight portion in fluid communication with a first one of the manifold apertures, a tortuous portion, an arc portion, and a second straight portion in fluid communication with a second one of the manifold apertures. A coolant flow field is provided on the rear surface, fluidly connecting two of the manifold apertures, having open-faced flow channels that are all substantially the same length and arranged to uniformly distribute coolant on the rear surface of the flow field plate. The flow field plate further comprises coolant inlet distribution flow channels that are fluidly connected between a first one of the manifold apertures and the primary coolant flow channels, and where each of the coolant inlet distribution flow channels has a longitudinally extending portion and a transversely extending portion; and coolant outlet collection flow channels that are fluidly connected between a second one of the manifold apertures and the primary coolant flow channels, and where each of the collection flow channels has a longitudinally transversely extending portion. A first set of aperture extensions extends from the first one of the manifold apertures to the first slot, over a portion of the rear surface; and a second set of aperture extensions extends from the second one of the manifold apertures to the second slot, over a portion of the rear surface.

FILE SEGMENT: CPI EPI
FIELD AVAILABILITY: AB; GI; DCN
MANUAL CODES: CPI: E10-E04E1; E10-E04L1; E11-N; E31-A02; E31-A03; E31-D01; E31-D02; E31-K02; E31-K05A; E31-N05D; J03-B03
EPI: X16-C; X25-R01C

L29 ANSWER 5 OF 16 WPIX
ACCESSION NUMBER: 2005-058039 [06] WPIX
DOC. NO. NON-CPI: N2005-050228
TITLE: **Fuel cell** module e.g. for **proton exchange membrane fuel cell**, draws hydrogen from reservoir to react with oxygen in **fuel cell** module consuming entire amount of reactants in **fuel cell** during

shutdown of **fuel cell** module.

DERWENT CLASS: X16
INVENTOR(S): JOOS, N I
PATENT ASSIGNEE(S): (JOOS-I) JOOS N I; (HYDR-N) HYDROGENICS CORP
COUNTRY COUNT: 108
PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
WO 2004114448	A2	20041229	(200506)*	EN	37	H01M008-04
US 2005026022	A1	20050203	(200511)			H01M008-04

WO 2004114448 designated states:

RW: AT BE BG BW CH CY CZ DE DK EA EE ES FI FR GB GH GM GR HU IE IT KE LS LU MC MW MZ NA NL OA PL PT RO SD SE SI SK SL SZ TR TZ UG ZM ZW

W: AE AG AL AM AT AU AZ BA BB BG BR BW BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE EG ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NA NI NO NZ OM PG PH PL PT RO RU SC SD SE SG SK SL SY TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW

APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
WO 2004114448	A2	WO 2004-CA954	20040625
US 2005026022	A1 Provisional	US 2003-482010P	20030625
	Provisional	US 2003-495091P	20030815
		US 2004-875288	20040625

PRIORITY APPLN. INFO: US 2003-495091P 20030815; US 2003-482010P 20030625; US 2004-875288 20040625

INT. PATENT CLASSIF.:
MAIN: H01M008-04

BASIC ABSTRACT:

WO2004114448 A UPAB: 20050907

NOVELTY - The **fuel cell** stack (200) has **anode** connected to hydrogen reservoir (19) and **cathode** connected to mixture of oxygen and nitrogen, provided electrolyte medium of **proton exchange membrane (PEM)**. During shutdown of **fuel cell** module (300), the hydrogen is drawn from reservoir to react with oxygen in **fuel cell** module (300) consuming entire amount of reactants and leaving non-reactant nitrogen in **fuel cell.**

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for **fuel cell** shutdown process.

USE - **Fuel cell** module e.g. for **proton exchange membrane (PEM) fuel cell,** alkaline **fuel cell** (AFC), direct methanol **fuel cell** (DMFC), molten carbonate **fuel cell** (MCFC), phosphoric acid **fuel cell** (PAFC), solid oxide **fuel cell** (SOFC) and **regenerated fuel cell.**

ADVANTAGE - Enables efficient shutdown of the **fuel cell,** while reducing the rate of wear and degradation of components of **fuel cell** during shutdown and restart processes.

DESCRIPTION OF DRAWING(S) - The figure shows a schematic view of arrangement of the **fuel cell** module.

valves 10-13
parasitic load 17
hydrogen reservoir 19
fuel cell stack 200
fuel cell module 300
Dwg.2/6

FILE SEGMENT: EPI
FIELD AVAILABILITY: AB; GI
MANUAL CODES: EPI: X16-C01C; X16-C09; X16-C15A

L29 ANSWER 6 OF 16 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN
ACCESSION NUMBER: 2004-804552 [79] WPIX
DOC. NO. NON-CPI: N2004-634262
DOC. NO. CPI: C2004-280830
TITLE: Preparation and storage of a membrane and electrode assembly useful in electrochemical cells involves contacting an electrocatalyst of the assembly with a cation exchange membrane.
DERWENT CLASS: A14 A85 L03 X16
INVENTOR(S): MURPHY, O J; SALINAS, C
PATENT ASSIGNEE(S): (MURP-I) MURPHY O J; (SALI-I) SALINAS C; (LYNN-N) LYNNTECH INC
COUNTRY COUNT: 108
PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
WO 2004095615	A2	20041104	(200479)*	EN	48	H01M008-00
US 2005000799	A1	20050106	(200504)			C25B009-08

For WO 2004095615:
RW: AT BE BG BW CH CY CZ DE DK EA EE ES FI FR GB GH GM GR HU IE IT KE LS LU MC MW MZ NL OA PL PT RO SD SE SI SK SL SZ TR TZ UG ZM ZW
W: AE AG AL AM AT AU AZ BA BB BG BR BW BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE EG ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NA NI NO NZ OM PG PH PL PT RO RU SC SD SE SG SK SL SY TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW

APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
WO 2004095615	A2	WO 2004-US12162	20040419
US 2005000799	A1 Provisional	US 2003-463768P	20030417
		US 2004-828507	20040419

PRIORITY APPLN. INFO: US 2003-463768P 20030417; US 2004-828507 20040419
INT. PATENT CLASSIF.:
MAIN: C25B009-08; H01M008-00
SECONDARY: C25B011-06; C25B013-08
BASIC ABSTRACT:
WO2004095615 A UPAB: 20041208
NOVELTY - Preparation (P1) and storage of a membrane and electrode assembly involves contacting at least one electrocatalyst of the assembly with a cation exchange membrane in either an alkali metal cation, a dry proton or a sulfonyl-fluoride form during a period without passing an electrical current through the membrane and electrode assembly.
DETAILED DESCRIPTION - An INDEPENDENT CLAIM is included for converting (P2) a **proton exchange**

membrane having hydrated proton form to alkali metal cation form involving passing an electrical current through a membrane and electrode assembly having at least one electrocatalyst in contact with a cation exchange membrane in a hydrated proton form; supplying an alkali metal hydroxide solution under an electrical potential and removing the electrical potentials across the membranes.

USE - For preparing membrane and electrode assembly useful in devices such as electrochemical cells or electrochemical cell stacks e.g. an electrolyzer or **fuel cell** (claimed).

ADVANTAGE - The method protects the electrocatalyst against degradation, dissolution and/or corrosion usually seen when a hydrated protonated cation exchange membrane is used during storage or shipment of an electrolytic cell. The solid electrolyte membranes formed are simple to use and more compact than the other type of electrolytes. Use of an ion exchange membrane instead of a liquid electrolyte offers several advantages such as simplified fluid management and elimination of the potential of corrosive liquids. The membrane also serves as an electronically insulating separator between the **anode** and **cathode** in electrochemical cells.

Dwg.0/15

TECHNOLOGY FOCUS:

WO 2004095615 A2UPTX: 20041208

TECHNOLOGY FOCUS - ELECTRONICS - Preferred Method: (P1) further involves: a) placing the wet or dry membrane and electrode assembly into an electrochemical cell or an electrochemical cell stack; b) supplying the membrane and electrode assembly with reactants (preferably with water to convert the **proton exchange membrane** from dry proton form to hydrated acidic form); c) providing an electrical current through the assembly to liberate protons and convert the membrane from the alkali metal cation to an acidic proton form; d) converting the cation exchange from the sulfonyl-fluoride form to an alkali metal cation via contacting the cation exchange membrane with an alkali metal hydroxide solution having concentration of 0.1 - 10 (preferably 0.5 - 5, especially 0.75 - 3)M and selected from sodium hydroxide (NaOH), potassium hydroxide (KOH), lithium hydroxide (LiOH), rubidium hydroxide (RbOH), cesium hydroxide (CsOH) and/or francium hydroxide (FrOH) for 0.25 - 24 (preferably 0.5 - 12, especially 1 - 6)hours; e) removing the alkali metal hydroxide solution from the electrical **cell**; f) **restoring** the electrical potential across the electrochemical cell to liberate protons and convert the **proton exchange membrane** from the alkali metal cation back to the acidic form. Steps B and C are performed simultaneously or nearly simultaneously. Preferred Components: The electrocatalyst includes lead dioxide. The membrane and electrode assembly is disposed between an **anode** flow field and a **cathode** flow field in an electrochemical cell stack.

FILE SEGMENT: CPI EPI
FIELD AVAILABILITY: AB
MANUAL CODES: CPI: A04-A; A04-E10; A12-E06B; A12-E09; A12-M05; A12-W11A; L03-E04B
EPI: X16-E06A

L29 ANSWER 7 OF 16 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN
ACCESSION NUMBER: 2004-431248 [40] WPIX
DOC. NO. NON-CPI: N2004-341071
DOC. NO. CPI: C2004-161352
TITLE: **Fuel cell** assembly for use as power generation equipment, comprises pressurized container, **fuel cell**, and

thermal shield.

DERWENT CLASS: L03 X16
INVENTOR(S): BALAN, C; BUNKER, R S
PATENT ASSIGNEE(S): (GENE) GENERAL ELECTRIC CO
COUNTRY COUNT: 36
PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
US 2004101726	A1	20040527	(200440)*		12	H01M008-02
CA 2449261	A1	20040527	(200440)	EN		H01M008-04
EP 1427045	A2	20040609	(200440)	EN		H01M008-02
R: AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LT LU LV MC MK NL PT RO SE SI SK TR						
JP 2004179166	A	20040624	(200441)		11	H01M008-04
CN 1507100	A	20040623	(200461)			H01M008-04
US 6896987	B2	20050524	(200535)			H01M008-02
IN 2003001396	I1	20051125	(200604)	EN		H01M008-04

APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
US 2004101726	A1	US 2002-305162	20021127
CA 2449261	A1	CA 2003-2449261	20031113
EP 1427045	A2	EP 2003-257437	20031126
JP 2004179166	A	JP 2003-396594	20031127
CN 1507100	A	CN 2003-1119661	20031127
US 6896987	B2	US 2002-305162	20021127
IN 2003001396	I1	IN 2003-DE1396	20031112

PRIORITY APPLN. INFO: US 2002-305162 20021127
INT. PATENT CLASSIF.:
MAIN: H01M008-02; H01M008-04
SECONDARY: H01M008-00; H01M008-10; H01M008-12; H01M008-14; H01M008-24; H01M012-06

BASIC ABSTRACT:

US2004101726 A UPAB: 20041125

NOVELTY - A **fuel cell** assembly (10) comprises a pressurized container (14), a **fuel cell** (12) in the container, and a thermal shield (16). The thermal shield is located between the container and the **fuel cell** and spaced from the container to form a flow path for a cooling fluid.

USE - Used as power generation equipment.

ADVANTAGE - The **fuel cell** assembly has a thermal management system that can maintain more uniform thermal gradients of the container, reduce the temperature of the container itself, and enhance the desired thermal efficiency of the **fuel cell** assembly.

DESCRIPTION OF DRAWING(S) - The drawing shows a diagrammatical perspective view of a tubular **fuel cell** assembly incorporating a thermal shield.

Fuel cell assembly 10
Fuel cell 12
Pressurized container 14
Thermal shield 16
Anodes 20
Electrolyte 22
Cathode 24
Interconnect 26

Oxidant inlet 30
Dwg.2/12

TECHNOLOGY FOCUS:
US 2004101726 A1UPTX: 20040624
TECHNOLOGY FOCUS - ELECTRICAL POWER AND ENERGY - Preferred Components: The **fuel cell** is a solid oxide **fuel cell, proton exchange membrane fuel cell,** molten carbonate **fuel cell,** phosphoric acid **fuel cell,** alkaline **fuel cell,** direct methanol **fuel cell, regenerative fuel cell,** zinc air **fuel cell,** or protonic ceramic **fuel cell.** The **fuel cell** has a planar configuration, or a tubular configuration. The thermal shield defines an insulating layer on an inner surface of the thermal shield, and another insulating layer on an inner surface of the container. The thermal shield further comprises a second shield wall to define an inner surface of the container, and fluid conduits configured to flow the cooling fluid. The fluid conduits further comprises fluid distribution manifold to distribute the cooling fluid. The cooling fluid comprises an oxidant. The thermal shield comprises a cylindrical shield assembly. The cylindrical shield assembly further comprises a base and a seal configured to separate the cooling fluid from the oxidant; the base being configured to receive the seal.
TECHNOLOGY FOCUS - CERAMICS AND GLASS - Preferred Materials: The insulating layer is made of ceramic oxides, and/or cellular ceramic foam materials.

FILE SEGMENT: CPI EPI
FIELD AVAILABILITY: AB; GI
MANUAL CODES: CPI: L03-E04
EPI: X16-C

L29 ANSWER 8 OF 16 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN
ACCESSION NUMBER: 2004-327296 [30] WPIX
DOC. NO. NON-CPI: N2004-261022
DOC. NO. CPI: C2004-124094
TITLE: **Fuel cell** assembly used to generate electricity comprises **fuel cell**(s), fluid flow channel(s), and array(s) of flow disrupters.
DERWENT CLASS: A85 L03 X16
INVENTOR(S): BUNKER, R S
PATENT ASSIGNEE(S): (GENE) GENERAL ELECTRIC CO
COUNTRY COUNT: 38
PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
US 2004053094	A1	20040318	(200430)*		15	H01M008-04
CA 2439718	A1	20040318	(200430)	EN		H01M008-04
EP 1401043	A2	20040324	(200430)	EN		H01M008-04
R: AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LT LU LV MC MK NL PT RO SE SI SK TR						
JP 2004111395	A	20040408	(200430)		11	H01M008-02
KR 2004025602	A	20040324	(200446)			H01M008-04
CN 1495949	A	20040512	(200452)			H01M008-00
AU 2003231695	A1	20040401	(200453)			H01M008-02
SG 112891	A1	20050728	(200552)			H01M008-04

APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
US 2004053094	A1	US 2002-246066	20020918
CA 2439718	A1	CA 2003-2439718	20030904
EP 1401043	A2	EP 2003-255776	20030916
JP 2004111395	A	JP 2003-323817	20030917
KR 2004025602	A	KR 2003-64342	20030917
CN 1495949	A	CN 2003-124902	20030918
AU 2003231695	A1	AU 2003-231695	20030811
SG 112891	A1	SG 2003-5682	20030911

PRIORITY APPLN. INFO: US 2002-246066 20020918
INT. PATENT CLASSIF.:
MAIN: H01M008-00; H01M008-02; H01M008-04
SECONDARY: H01M008-24
BASIC ABSTRACT:
US2004053094 A UPAB: 20040511
NOVELTY - A **fuel cell** assembly has: **fuel cell**(s) having **anode** (20), **cathode** (30), and electrolyte; fluid flow channel(s) disposed within **fuel cell** for delivering fluid; and array(s) of flow disrupters (25) in contact with **anode, cathode**, and electrolyte, and protruding into fluid flow channels to disrupt flow of fluid and enhance heat transfer rate between fluid and cell assembly.
USE - Used to generate electricity.
ADVANTAGE - The **fuel cell** has improved fluid passages that provide improved heat transfer characteristics.
DESCRIPTION OF DRAWING(S) - The figure is an exemplary arrangement of flow disrupters in single **fuel cell**
.
Anode 20
Flow disrupters 25
Cathode 30
Fuel 34
Oxidant 38
Dwg.4/10
TECHNOLOGY FOCUS:
US 2004053094 A1UPTX: 20040511
TECHNOLOGY FOCUS - ELECTRICAL POWER AND ENERGY - Preferred Component: The array of flow disrupters comprise a second array of flow disrupters.
Preferred **Fuel Cell**: The **fuel cell** consists of solid oxide **fuel cells**, **proton exchange membrane fuel cells**, molten carbonate **fuel cells**, phosphoric acid **fuel cells**, alkaline **fuel cells**, direct methanol **fuel cells, regenerative fuel cells**
, zinc air **fuel cells**, or protonic ceramic **fuel cells.** The fluid flow channel comprises oxidant (38) flow channel.

TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - Preferred Materials: The flow disrupters can comprise material consisting of metallic nickel, silver, copper, cobalt, ruthenium, nickel-yttria-stabilized zirconia cermets, copper-yttria-stabilized zirconia cermets, nickel-ceria cermets, perovskite doped lanthanum manganate, strontium-doped lanthanum manganate, tin-doped indium oxide, strontium doped $PrMnO_3$, $LaFeO_3$-$LaCoO_3$, ruthenium oxide-yttria-stabilized zirconia, lanthanum cobaltite, zirconium oxide, yttria-stabilized zirconia, doped ceria,

cerium oxide, bismuth sesquioxide, pyrochlore oxides, doped zirconates, and/or perovskite oxide materials.
TECHNOLOGY FOCUS - POLYMERS - The flow disrupters can comprise material consisting of perfluorinated sulfonic acid polymers and/or polymer composites.

FILE SEGMENT: CPI EPI
FIELD AVAILABILITY: AB; GI
MANUAL CODES: CPI: A12-E06; L03-E04
EPI: X16-C15; X16-K

L29 ANSWER 9 OF 16 WPIX
ACCESSION NUMBER: 2004-237628 [22] WPIX
DOC. NO. NON-CPI: N2004-188384
DOC. NO. CPI: C2004-092851
TITLE: **Fuel cell** assembly, e.g. solid oxide **fuel cell** assembly, comprises **fuel cell**(s), interconnect, fluid flow channel(s) disposed in **fuel cell**(s), and fiber(s) disposed in fluid flow channel(s) to disrupt fluid flow.
DERWENT CLASS: L03 X16
INVENTOR(S): BUNKER, R S
PATENT ASSIGNEE(S): (GENE) GENERAL ELECTRIC CO
COUNTRY COUNT: 38
PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
US 2004028988	A1	20040212	(200422)*		16	H01M008-02
CA 2436070	A1	20040206	(200422)	EN		H01M008-04
JP 2004071568	A	20040304	(200422)		11	H01M008-02
EP 1406331	A1	20040407	(200425)	EN		H01M008-02
R: AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LT LU LV MC MK NL PT RO SE SI SK TR						
CN 1481046	A	20040310	(200437)			H01M008-04
KR 2004014282	A	20040214	(200439)			H01M008-04
AU 2003212048	A1	20040226	(200451)			H01M008-04
SG 111157	A1	20050530	(200544)			H01M008-02
US 6953633	B2	20051011	(200567)			H01M008-02

APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
US 2004028988	A1	US 2002-212541	20020806
CA 2436070	A1	CA 2003-2436070	20030724
JP 2004071568	A	JP 2003-286539	20030805
EP 1406331	A1	EP 2003-254885	20030806
CN 1481046	A	CN 2003-127419	20030806
KR 2004014282	A	KR 2003-54168	20030805
AU 2003212048	A1	AU 2003-212048	20030711
SG 111157	A1	SG 2003-5846	20030728
US 6953633	B2	US 2002-212541	20020806

PRIORITY APPLN. INFO: US 2002-212541 20020806
INT. PATENT CLASSIF.:
MAIN: H01M008-02; H01M008-04
SECONDARY: H01B008-04; H01M008-00; H01M008-08; H01M008-10; H01M008-12
BASIC ABSTRACT:

US2004028988 A UPAB: 20040331
NOVELTY - A **fuel cell** assembly (10) comprises fuel (34) cell(s) having **anode** (22), **cathode** (18), and electrolyte (20); interconnect (24) in intimate contact with **anode**, **cathode**, or electrolyte; fluid flow channel(s) disposed in **fuel cell**(s); and fiber(s) (40) disposed in fluid flow channel(s) to disrupt fluid flow during travel of fluid flow in fluid flow channel(s).

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for a fluid flow channel for **fuel cell** assembly comprising housing having defining flow path(s) for fluid flow, and fiber(s) disposed in housing directly or indirectly attached to side portions or connecting portion. The housing includes pair of opposing side portions, and connecting portion joining the pair of opposing side portions.

USE - For use as **fuel cell** assembly, e.g. solid oxide **fuel cell** assembly.

ADVANTAGE - The invention provides improved cooling requirements of **fuel cell** with improved heat transfer characteristics, thus improve cooling ability. It enables the maintenance of predetermined thermal gradients and temperature levels.

DESCRIPTION OF DRAWING(S) - The figure is a perspective view of a planar **fuel cell** stack.

Fuel cell assembly 10
Cathode 18
Electrolyte 20
Anode 22
Interconnect 24
Oxidant flow channel 28
Oxidant 32
Fuel 34
Fiber 40
Dwg.1/10

TECHNOLOGY FOCUS:

US 2004028988 A1UPTX: 20040331

TECHNOLOGY FOCUS - ELECTRICAL POWER AND ENERGY - Preferred Component: The **fuel cell** is from solid oxide **fuel cells**, **proton exchange membrane** or solid polymer **fuel cells**, molten carbonate **fuel cells**, phosphoric acid fuels, alkaline **fuel cells**, direct methanol **fuel cells**, **regenerative fuel cells**, zinc air **fuel cells**, or protonic ceramic **fuel cells**. It comprises planar **fuel cell** or tubular **fuel cell**. The fluid flow channel(s) comprises oxidant (32) flow channel (28).

TECHNOLOGY FOCUS - METALLURGY - Preferred Material: The fiber comprises a high temperature resistant material from chromium based ferritic stainless steel, cobaltite, ceramic, lanthanum chromate, cobalt dichromate, Inconel 600, Inconel 601, Hastelloy X, Hastelloy-230, Ducrolloy, Kovar, and/or ebrite.

Preferred Property: The fiber(s) has a thickness of 5-20% of the width of the fluid flow channel. The fiber has cross-sectional area from square, rectangle, circle, ellipse, or annulus.

FILE SEGMENT: CPI EPI
FIELD AVAILABILITY: AB; GI
MANUAL CODES: CPI: L03-E04A1
EPI: X16-C01A; X16-C15

L29 ANSWER 10 OF 16 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN
ACCESSION NUMBER: 2004-142531 [14] WPIX
DOC. NO. NON-CPI: N2004-113750
DOC. NO. CPI: C2004-057154
TITLE: Electrochemical cell (e.g. **fuel cell**) comprises membrane electrode assembly comprising first active area and opposingly positioned second active area, each of active areas comprising electrodes, and flow field support having flow region.
DERWENT CLASS: A85 L03 X16
INVENTOR(S): BALASUBRAMANIAN, B; BARBIR, F; BYRON, R H; STONE, M
PATENT ASSIGNEE(S): (BALA-I) BALASUBRAMANIAN B; (BARB-I) BARBIR F; (BYRO-I) BYRON R H; (STON-I) STONE M
COUNTRY COUNT: 1
PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
US 2004018407	A1	20040129	(200414)*		16	H01M008-02

APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
US 2004018407	A1	US 2002-202701	20020725

PRIORITY APPLN. INFO: US 2002-202701 20020725
INT. PATENT CLASSIF.:
MAIN: H01M008-02
BASIC ABSTRACT:

US2004018407 A UPAB: 20040226
NOVELTY - An electrochemical cell (72) comprises a membrane electrode assembly (76) comprising a first active area and an opposingly positioned second active area, each of active areas comprising electrodes and having a length to width ratio, such that a temperature differential measured across the shortest distance from a center of each of the active areas to an edge of the active areas is less than 15 deg. C; and a flow field support having a flow region.

DETAILED DESCRIPTION - An electrochemical cell comprises a membrane electrode assembly comprising a first active area and an opposingly positioned second active area, each of the active areas comprising electrodes and having a length to width ratio, such that a temperature differential measured across the shortest distance from a center of each of the active areas to an edge of the active areas is less than 15 deg. C; and a flow field support disposed adjacent to the membrane electrode assembly, and having a flow region that aligns with the first or second active area of the membrane electrode assembly. INDEPENDENT CLAIMS are also included for:

(a) a method of cooling an electrochemical cell, comprising radiating heat from a fin extending from an edge of a flow field support of the electrochemical cell; and flowing air along the fin to convectively remove heat from the flow field support;

(b) a method of humidifying or heating a reactant gas fed to an electrochemical cell, comprising atomizing a liquid product stream of the electrochemical cell; and spraying the atomized liquid product stream onto the reactant gas; and

(c) a method of heating an electrochemical cell, comprising passing an electric current through a resistive heating component

disposed at a flow field support of the electrochemical cell.
USE - The invention is used as electrolysis cell or **fuel cell.** It is useful as an **anode** feed electrolysis **cells, cathode** feed electrolysis **cells**, and **regenerative fuel cells.**

ADVANTAGE - The invention provides superior functionality. The shape of the flow field facilitates the dissipation of heat from the edges of the flow field supports, and radiation of the heat outward from the cell. Convective airflow along the edges of the flow field supports further enhances the efficiency of the heat removal. By effectively removing the heat, the life of the cell can be prolonged beyond the life of a conventional cell. The design allows for the removal of latent via the water stream from the **cathode.** Heat removal via a combination of the water stream and airflow enables the electrochemical cell to be operated with fewer plates (82). Because the cell stack (70) includes the stacked plates maintained in alignment by side plates, misalignment of the membrane electrode assemblies with respect to the plates is minimized. Because of the dimensions of the plates, a cell stack can be constructed from fewer plates than a **fuel cell** having the same output and power requirements, which translates into fewer pieces for assembly and service. Compression of the plates is also improved, in that multiple compression devices (74) exerting pressure against a common component tend to provide more uniform compression, over a greater area than conventional compression devices for cell stacks. By minimizing the angle at which the channels extend over the bipolar plates (78), a linear path for the flow of reactant gases and the removal of water is effected. Thus, minimizes the probability of fluid holdup in the channels, which also minimizes the amount of phase separation of the humidified reactant gases in the bipolar plates, further contributing to effective heat removal. The need for introducing a separate humidification stream is reduced, which, in turn reduces the amount of cell inputs. Use of the stream as a humidification stream reduces the by-product output of the cell, and promotes a more self-contained and self-sufficient aspect of **fuel cell** technology.

DESCRIPTION OF DRAWING(S) - The figure is an exploded perspective view of a cell stack.

Cell stack 70
- Electrochemical cell 72
- Compression devices 74
- Membrane electrode assembly 76
- Bipolar plates 78

Plates 82
Side plate 122
Tabs 126
Holes 128
Dwg.3/9

TECHNOLOGY FOCUS:
US 2004018407 A1UPTX: 20040226
TECHNOLOGY FOCUS - ELECTRICAL POWER AND ENERGY - Preferred Component: The electrochemical cell comprises a urethane spring disposed adjacent to the flow field support, to urge the flow field support against the membrane electrode assembly to maintain the flow field support and the membrane electrode assembly, in a compressive relationship; tabs (126) disposed at peripheral edges of the membrane electrode assembly and the flow field support, the tabs being engageable with holes (128) disposed in a side plate (122) to maintain the membrane electrode assembly and the flow field support in alignment; and a heater disposed at the flow field support

adjacent to the membrane electrode assembly. The heater is an electrically resistive component. The membrane electrode assembly comprises a **proton exchange membrane**;
a first electrode disposed at a first active area of the **proton exchange membrane**; and a second electrode disposed at a second active area of the **proton exchange membrane.** Preferred Parameter: Each of the temperature differentials is effected by the length to width ratio of the active areas being at least4-1.

FILE SEGMENT: CPI EPI
FIELD AVAILABILITY: AB; GI
MANUAL CODES: CPI: A12-E06; L03-E04
EPI: X16-C01

L29 ANSWER 11 OF 16 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN
ACCESSION NUMBER: 2004-042143 [04] WPIX
DOC. NO. NON-CPI: N2004-034103
TITLE: Polymer electrolyte membrane **fuel cell** stack performance **regenerating** method, involves interrupting flow of oxidant reactant gas to **cathode** of cell for period sufficient to reduce cell voltage to less than specified value.
DERWENT CLASS: X16
INVENTOR(S): BALLIET, R J; REISER, C A
PATENT ASSIGNEE(S): (BALL-I) BALLIET R J; (REIS-I) REISER C A; (UTCF-N) UTC FUEL CELLS LLC
COUNTRY COUNT: 102
PATENT INFORMATION:

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PATENT NO       KIND DATE     WEEK      LA   PG MAIN IPC
---------------------------------------------------------
US 2003224228    A1 20031204 (200404)*        10 H01M008-04
WO 2003103081    A1 20031211 (200407)   EN       H01M008-00
   RW: AT BE BG CH CY CZ DE DK EA EE ES FI FR GB GH GM GR HU IE IT
       KE LS LU MC MW MZ NL OA PT RO SD SE SI SK SL SZ TR TZ UG ZM
       ZW
    W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ
       DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP
       KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ
       NO NZ OM PH PL PT RO RU SC SD SE SG SK SL TJ TM TN TR TT TZ
       UA UG UZ VC VN YU ZA ZM ZW
AU 2003237878    A1 20031219 (200449)            H01M008-00
US 6841278       B2 20050111 (200505)            H01M008-00
DE 10392684      T0 20050609 (200538)            H01M008-00
JP 2005528765    W  20050922 (200563)          9 H01M008-04
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APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
US 2003224228	A1	US 2002-160384	20020530
WO 2003103081	A1	WO 2003-US15535	20030516
AU 2003237878	A1	AU 2003-237878	20030516
US 6841278	B2	US 2002-160384	20020530
DE 10392684	T0	DE 2003-10392684	20030516
		WO 2003-US15535	20030516
JP 2005528765	W	WO 2003-US15535	20030516
		JP 2004-510058	20030516

FILING DETAILS:

PATENT NO	KIND		PATENT NO
AU 2003237878	A1	Based on	WO 2003103081
DE 10392684	T0	Based on	WO 2003103081
JP 2005528765	W	Based on	WO 2003103081

PRIORITY APPLN. INFO: US 2002-160384 20020530
INT. PATENT CLASSIF.:
MAIN: H01M008-00; H01M008-04
SECONDARY: H01M008-10
BASIC ABSTRACT:

US2003224228 A UPAB: 20040115
NOVELTY - The method involves disconnecting a normal load (43) from a **fuel cell** and connecting in its place an auxiliary load (50) for drawing a preset amount of current. A flow of oxidant reactant gas is interrupted to a **cathode** (16) of the cell for a period sufficient to reduce the cell voltage to less than 0.1 volts. The gas is interrupted while the auxiliary load is connected to the cell for a preset number of repetitions.

USE - Used for regenerating performance of a polymer electrolyte membrane (**PEM**) **fuel cell** stack

ADVANTAGE - The method interrupts the flow of oxidation gas to reduce the cell voltage to less than 0.1 volts to provide rates of decay that decrease following rejuvenation, thereby reducing the time required to rejuvenate a **fuel cell.**

DESCRIPTION OF DRAWING(S) - The drawing shows a simplified, stylized, schematic depiction of a **fuel cell** power plant including one cell of a **fuel cell** stack, capable of rejuvenation.

Anode 14
Cathode 16
Water transport plate 19
Load 43
Auxiliary load 50
Dwg.1/6

FILE SEGMENT: EPI
FIELD AVAILABILITY: AB; GI
MANUAL CODES: EPI: X16-C01C; X16-C09; X16-C15

L29 ANSWER 12 OF 16 WPIX
ACCESSION NUMBER: 2003-267195 [26] WPIX
DOC. NO. NON-CPI: N2003-212379
TITLE: **Fuel cell** system for vehicle, includes integrated heat exchanger with **cathode** exhaust condenser and **fuel cell** stack cooler arranged side-by-side, to be cooled by common cooling air stream.
DERWENT CLASS: X16
INVENTOR(S): VOSS, M C; WATTELET, J P; VOSS, M G
PATENT ASSIGNEE(S): (VOSS-I) VOSS M C; (WATT-I) WATTELET J P; (MODI) MODINE MFG CO
COUNTRY COUNT: 25
PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
US 2003011721	A1	20030116	(200326)*		9	H01M008-02
WO 2003009409	A2	20030130	(200326)	EN		H01M008-02
RW: AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR						
W: CA CN JP RU						
EP 1428277	A2	20040616	(200439)	EN		H01M008-02

R: AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR

US 6824906	B2	20041130	(200479)		H01M008-04
CN 1529920	A	20040915	(200501)		H01M008-02
JP 2005505892	W	20050224	(200516)	34	H01M008-04

APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
US 2003011721	A1	US 2001-906336	20010716
WO 2003009409	A2	WO 2002-US22491	20020716
EP 1428277	A2	EP 2002-750064	20020716
		WO 2002-US22491	20020716
US 6824906	B2	US 2001-906336	20010716
CN 1529920	A	CN 2002-814213	20020716
JP 2005505892	W	WO 2002-US22491	20020716
		JP 2003-514644	20020716

FILING DETAILS:

PATENT NO	KIND	PATENT NO
EP 1428277	A2 Based on	WO 2003009409
JP 2005505892	W Based on	WO 2003009409

PRIORITY APPLN. INFO: US 2001-906336 20010716
INT. PATENT CLASSIF.:
MAIN: H01M008-02; H01M008-04
SECONDARY: H01M008-06; H01M008-10
BASIC ABSTRACT:

US2003011721 A UPAB: 20030428
NOVELTY - An integrated heat exchanger (12) includes adjacently arrange **cathode** exhaust condenser (16) and **fuel cell** stack cooler (14), with a condensation path (43) and a coolant path (45), to transfer heat from the **cathode** exhaust gas and coolant to the common cooling air stream, respectively.

USE - **Fuel cell** system such as **proton exchange membrane fuel cell**, alkaline **fuel cell**, phosphoric acid **fuel cell**, solid oxide **fuel cell**, molten carbonate **fuel cell**, direct methanol **fuel cell** and **regenerative fuel cell** systems for use in vehicular application, and non-vehicular applications.

ADVANTAGE - The cost is reduced since the exchanger requires only few units and simple mounting procedure. Since the exchanger has separate inlet and outlet manifolds and cooling passage and condensation passage for the condenser and the **fuel cell** stack cooler, intermixing of **cathode** exhaust gas and coolant is prevented, and the efficiency of the heat exchanger is improved.

DESCRIPTION OF DRAWING(S) - The figure shows the block diagram of the **fuel cell** system.

integrated heat exchanger 12
fuel cell stack cooler 14
cathode exhaust condenser 16
condensation path 43
coolant path 45
Dwg.1/6

FILE SEGMENT: EPI
FIELD AVAILABILITY: AB; GI

MANUAL CODES: EPI: X16-C09

L29 ANSWER 13 OF 16 WPIX
ACCESSION NUMBER: 2002-383302 [41] WPIX
DOC. NO. NON-CPI: N2002-300036
DOC. NO. CPI: C2002-108100
TITLE: Tungsten-containing catalyst for **fuel cells**, comprise carbon support having surface layer of tungsten, and generates power greater than power generated by platinum catalyst, when operated under same conditions.
DERWENT CLASS: J04 L03 X16
INVENTOR(S): CHRISTIAN, J B; MENDENHALL, R G; MEDENHALL, R G
PATENT ASSIGNEE(S): (CHRI-I) CHRISTIAN J B; (MEND-I) MENDENHALL R G; (OSRA-N) OSRAM SYLVANIA INC
COUNTRY COUNT: 97
PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
WO 2002027827	A1	20020404	(200241)*	EN	25	H01M004-86
RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SL SZ TR TZ UG ZW						
W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW						
AU 2001096414	A	20020408	(200252)			H01M004-86
US 2002111267	A1	20020815	(200256)			B01J021-18
GB 2385195	A	20030813	(200354)			H01M004-86
DE 10196693	T	20030828	(200357)			H01M004-86
EP 1358687	A1	20031105	(200377)	EN		H01M004-86
R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI TR						
US 6656870	B2	20031202	(200379)			H01M004-88
US 2004023795	A1	20040205	(200416)#			B01J021-18
JP 2004510316	W	20040402	(200424)		39	H01M004-90

APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
WO 2002027827	A1	WO 2001-US30557	20010928
AU 2001096414	A	AU 2001-96414	20010928
US 2002111267	A1 Provisional	US 2000-236503P	20000929
		US 2001-965444	20010927
GB 2385195	A	WO 2001-US30557	20010928
		GB 2003-6435	20030320
DE 10196693	T	DE 2001-10196693	20010928
		WO 2001-US30557	20010928
EP 1358687	A1	EP 2001-977281	20010928
		WO 2001-US30557	20010928
US 6656870	B2 Provisional	US 2000-236503P	20000929
		US 2001-965444	20010927
US 2004023795	A1 Cont of	US 2001-965444	20010927
		US 2003-631302	20030731
JP 2004510316	W	WO 2001-US30557	20010928
		JP 2002-531521	20010928

FILING DETAILS:

PATENT NO	KIND		PATENT NO
AU 2001096414	A	Based on	WO 2002027827
GB 2385195	A	Based on	WO 2002027827
DE 10196693	T	Based on	WO 2002027827
EP 1358687	A1	Based on	WO 2002027827
US 2004023795	A1	Cont of	US 6656870
JP 2004510316	W	Based on	WO 2002027827

PRIORITY APPLN. INFO: US 2000-236503P 20000929; US
2001-965444 20010927; US
2003-631302 20030731

INT. PATENT CLASSIF.:
MAIN: B01J021-18; H01M004-86; H01M004-88; H01M004-90
SECONDARY: B01J023-30; B05D005-12; C25B011-03; H01M004-96

BASIC ABSTRACT:

WO 200227827 A UPAB: 20031009

NOVELTY - The tungsten-containing catalyst comprises a carbon support having a surface layer containing tungsten. The catalyst generates power which is 20% greater than the power output of an equivalently prepared platinum catalyst, when operated under same conditions using an electrochemical oxidation of hydrogen.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are included for the following:

(a) Manufacture of tungsten-containing **fuel cell** catalyst;

(b) **Regeneration** of tungsten-containing **fuel cell** catalyst

USE - For **fuel cells.**

ADVANTAGE - The tungsten-containing **fuel cell** catalyst exhibits high electrochemical activity as that of platinum, without an expensive co-catalyst. The catalyst is generated and **regenerated** insitu in a **fuel cell.** The catalyst generates power which is 100% greater than that generated by a platinum catalyst when operated under similar conditions. The lost catalyst could be reactivated on a periodic basis to reverse aging due to oxidation and contamination. The used catalyst can be replenished by adding dilute tungstate solution to provide catalyst precursor in situ without requiring disassembly.

DESCRIPTION OF DRAWING(S) - The figure shows the comparative analysis of the power output of hydrogen air **proton exchange membrane fuel cell** having platinum catalyst **cathode** and **anode** made of tungsten containing **fuel cell** catalyst, and **fuel cell** having both platinum catalyst **anode** and **cathode.**

Dwg.4/4

TECHNOLOGY FOCUS:

WO 200227827 A1UPTX: 20020701

TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - Preferred Material: The carbon support is carbon black which is pretreated using a cationic surfactant such as cetylpyridinum chloride.

FILE SEGMENT: CPI EPI
FIELD AVAILABILITY: AB; GI
MANUAL CODES: CPI: J04-E04; L03-E04B; N03-C02; N07-L03A
EPI: X16-E06

L29 ANSWER 14 OF 16 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN
ACCESSION NUMBER: 2002-255935 [30] WPIX
DOC. NO. NON-CPI: N2002-197952
TITLE: **Regenerative fuel cell** education kit includes **fuel cell**

with pressure resistant casing, which is charged and discharged by respective units.
DERWENT CLASS: Q13 W04 X16
INVENTOR(S): STAATS, R V
PATENT ASSIGNEE(S): (STAA-I) STAATS R V
COUNTRY COUNT: 1
PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
US 2002025467	A1	20020228	(200230)*		8	H01M008-10
US 6589683	B2	20030708	(200353)			H01M002-02

APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
US 2002025467	A1 Provisional	US 2000-194639P	20000404
		US 2001-826159	20010403
US 6589683	B2 Provisional	US 2000-194639P	20000404
		US 2001-826159	20010403

PRIORITY APPLN. INFO: US 2000-194639P 20000404; US 2001-826159 20010403
INT. PATENT CLASSIF.:
MAIN: H01M002-02; H01M008-10
SECONDARY: B60K001-00; G09B023-18; H01M002-06; H01M002-10; H01M002-12; H01M008-18
BASIC ABSTRACT:

US2002025467 A UPAB: 20020513
NOVELTY - A **fuel cell** (10) includes a pressure resistant casing, an **anode** and **cathode** conductively attached to a catalyzed **proton exchange membrane** (**PEM**) (11). A wind mill (30), an AC system (40), a direct DC system (50), a hand crank system (60) or a photo-voltaic system (70) charges the **fuel cell** and a discharging unit discharges the **fuel cell.**

USE - For illustrating the use and application of the **regenerated fuel cell.**

ADVANTAGE - The pressure resistant casing pressurizes the catalyzing event and prevents the escape of gases from the **fuel cell**, thus accidents due to **fuel cell** is avoided.

DESCRIPTION OF DRAWING(S) - The figure shows the schematic view of the **fuel cell** education kit.

Fuel cell 10
PEM 11
Wind mill 30
AC system 40
Direct DC system 50
Hand crank system 60
Photo-voltaic system 70
Dwg.1A/6

FILE SEGMENT: EPI GMPI
FIELD AVAILABILITY: AB; GI
MANUAL CODES: EPI: W04-W07C; X16-C01; X16-C01C

L29 ANSWER 15 OF 16 WPIX
ACCESSION NUMBER: 2002-114636 [15] WPIX
DOC. NO. NON-CPI: N2002-085400

The current Application

DOC. NO. CPI: C2002-035313
TITLE: Operation of **fuel cell** for automotive applications involves **regeneration** of **cell** by providing hydrogen containing fuel to **anode** while operating cell to reduce **cathode** potential.
DERWENT CLASS: E36 H06 L03 X16
INVENTOR(S): DONAHUE, J; FULLER, T F; YANG, D; YI, J S
PATENT ASSIGNEE(S): (ITFU) INT FUEL CELLS LLC; (UTCF-N) UTC FUEL CELLS LLC
COUNTRY COUNT: 94
PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
WO 2001099218	A1	20011227	(200215)*	EN	30	H01M008-04
AU 2001066893	A	20020102	(200230)			H01M008-04
US 6399231	B1	20020604	(200242)			H01M008-04
DE 10196359	T	20030710	(200353)			H01M008-04
JP 2003536232	W	20031202	(200382)		37	H01M008-04

RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SL SZ TR TZ UG ZW
W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CR CU CZ DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW

APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
WO 2001099218	A1	WO 2001-US18981	20010613
AU 2001066893	A	AU 2001-66893	20010613
US 6399231	B1	US 2000-602361	20000622
DE 10196359	T	DE 2001-10196359	20010613
		WO 2001-US18981	20010613
JP 2003536232	W	WO 2001-US18981	20010613
		JP 2002-503966	20010613

FILING DETAILS:

PATENT NO	KIND		PATENT NO
AU 2001066893	A	Based on	WO 2001099218
DE 10196359	T	Based on	WO 2001099218
JP 2003536232	W	Based on	WO 2001099218

PRIORITY APPLN. INFO: US 2000-602361 20000622
INT. PATENT CLASSIF.:
MAIN: H01M008-04
SECONDARY: H01M008-00; H01M008-06; H01M008-10
BASIC ABSTRACT:

WO 200199218 A UPAB: 20020306
NOVELTY - A **fuel cell** is operated by **regenerating cell** by providing a hydrogen containing fuel to an **anode** while operating the cell to reduce the **cathode** potential to below 0.66 V, and maintaining the **cathode** potential below the 0.66 V for a second period of time to restore at least a major portion of the cell performance.

DETAILED DESCRIPTION - Operation of a **fuel cell** involves providing a hydrogen containing fuel to the **anode** and an oxygen containing oxidant to the **cathode** to generate, for a first period of time, an electric current within the external circuit for operating the primary electricity using device, the cell operating conditions being selected such that, during the course of the first period of time, the **cathode** potential is maintained above 0.66 V and **cell** performance decreases. The **cell** is **regenerated** by providing a hydrogen containing fuel to the **anode** while operating the cell using procedures to reduce the **cathode** potential to below 0.66 V, and maintaining the **cathode** potential below the 0.66 V for a second period of time to restore at least a major portion of the cell performance. The steps are repeated to reduce the decrease in cell performance over time.

An INDEPENDENT CLAIM is also included for a **fuel cell** system comprising a **fuel cell** including a **proton exchange membrane** (**PEM**) as the electrolyte, an **anode** electrode disposed on one side of the membrane, and a **cathode** electrode disposed on the other side of the membrane; an external electric circuit connecting the **anode** and **cathode** electrodes; a primary electricity-using device connected to the external circuit; and mechanism for providing a hydrogen containing fuel to the **anode** electrode and for providing an oxidant to the **cathode** electrode. The **anode** and **cathode** electrodes are both comprise a platinum containing catalyst. The **fuel cell** system is constructed and arranged, and includes controller for maintaining the potential of the **cathode** electrode.

USE - For operating **fuel cell** for automotive applications.

ADVANTAGE - The invention can maintain high performance level of the cell for an extended period of time.

Dwg.0/4

TECHNOLOGY FOCUS:

WO 200199218 A1UPTX: 20020306

TECHNOLOGY FOCUS - ELECTRICAL POWER AND ENERGY - Preferred Method: The **cathode** potential is maintained at at most 0.5, preferably at most 0.1 V for the second period of time.

The operating procedures to reduce the **cathode** potential include the steps of stopping the flow of oxidant to the cell, disconnecting the primary electricity using device and replacing it with a battery in the external circuit, or providing a flow of hydrogen containing gas to the **cathode.**

Preferred Component: The **fuel cell** system may also include an auxiliary resistive load, and the controller includes mechanism for connecting, for the second period of time, the auxiliary resistive load in the circuit in place of the disconnected electricity using device.

The controller includes a mechanism for providing a flow of hydrogen containing fuel to the **cathode** electrode for the second period of time, in place of the interrupted flow of oxidant.

The fuel system includes a power source, and the controller includes mechanism for connecting, for the second period of time, the power source in the circuit in place of the disconnected electricity using device. It includes a supply of inert gas, and the controller includes mechanism for providing, during the second period of time, a flow of inert gas to the **cathode** electrode in place of the interrupted flow of oxidant. It includes an auxiliary resistive load, and the controller includes mechanism for connecting, for the the

second period of time, the auxiliary resistive load is in the circuit in place of the disconnected electricity using device.

FILE SEGMENT: CPI EPI
FIELD AVAILABILITY: AB; DCN
MANUAL CODES: CPI: E11-N; E31-A03; E31-D02; H06-A; L03-E04
EPI: X16-C; X16-C09

L29 ANSWER 16 OF 16 WPIX
ACCESSION NUMBER: 2000-531292 [48] WPIX
DOC. NO. NON-CPI: N2000-392810
DOC. NO. CPI: C2000-158238
TITLE: Electrochemical device e.g **fuel cells**, lead-acid batteries, water electrolyzers, comprises several single **fuel cells** connected in series and at least a titanium carbide bipolar plate disposed between adjacent cells.
DERWENT CLASS: A14 A17 A25 A26 A85 L03 X16 X25
INVENTOR(S): CROPLEY, C C; GRIFFITH, A E; KOSEK, J A; LACONTI, A B
PATENT ASSIGNEE(S): (USAT) US DEPT ENERGY
COUNTRY COUNT: 1
PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
US 6083641	A	20000704	(200048)*		6	H01M006-48

APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
US 6083641	A	US 1998-76018	19980508

PRIORITY APPLN. INFO: US 1998-76018 19980508
INT. PATENT CLASSIF.:
MAIN: H01M006-48
SECONDARY: H01M004-86; H01M004-88; H01M008-10
BASIC ABSTRACT:
US 6083641 A UPAB: 20001001
NOVELTY - An electrochemical device comprises several single **fuel cells** connected in series and at least a bipolar plate disposed between adjacent cells. Each **fuel cell** is comprised of an **anode, a cathode** and a separator containing electrolyte. The bipolar plate is comprised of titanium carbide (TiC).

USE - For producing electric energy or desired chemical compounds by interconverting electrical and chemical energy.

ADVANTAGE - The molded TiC bipolar plates are electrochemically more stable in various acidic medium and in potentials greater than 0.8-1.2 vs reversible hydrogen electrode (RHE) and exhibit superior corrosion resistance than commercially available carbon or graphite catalyst supports. The corrosion current in 190 deg. C 100 wt.% PAFC having molded TiC plate increases much more slowly with increasing potential than that of a PAFC having carbon plate. The molded TiC plate have superior electrical conductivity (5 times that of graphite), allow greater flexibility in the design of the plate and are easy to fabricate. Cost of molding the TiC plate is much less than cost to machine them. TiC are suitable for use in bipolar **regenerative PEM fuel cells**, lead-acid batteries, water electrolyzers.

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     Dwg.0/3
TECHNOLOGY FOCUS:
     US 6083641 A   UPTX: 20001001
     TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - Preferred Method: TiC is
     powder blended with a binder material and hot pressed at
     175-190degreesC and at 10,000-40,000 psi, preferably at 190degreesC
     and 30000 psi. Preferred Binder: The binder is polysulfone,
     polyvinylidene fluoride resin, polyethylene, polypropylene,
     fluoroethylenepropylene, polyimide, polyetheretherketone,
     polyetherketone, polyphenylene sulfide or polybenzyimidazole.

     TECHNOLOGY FOCUS - MECHANICAL ENGINEERING - Preferred Apparatus: The
     bipolar plate is a flat plate having integral ribs that define gas
     flow passages between adjacent single fuel cells
     .

     TECHNOLOGY FOCUS - ELECTRICAL POWER AND ENERGY - Preferred
     Fuel Cell: The single fuel cells
     are phosphoric acid fuel cells (PAFC). Preferred
     Property: The single fuel cells are
     regenerative proton exchange
     membrane fuel cells.
EXTENSION ABSTRACT:
     US 6083641 A   UPTX: 20001001
     EXAMPLE - No suitable example.
FILE SEGMENT:          CPI EPI
FIELD AVAILABILITY:    AB
MANUAL CODES:          CPI: A12-E06; A12-E09; L03-E01; L03-E04
                       EPI: X16-B01B; X16-C01C; X16-C04; X16-C15; X16-C16;
                            X25-R01C


=> d l62 que stat
L4         59349 SEA FILE=HCAPLUS FUEL(W)CELL#
L5          5517 SEA FILE=HCAPLUS PROTON(W)EXCHANGE(W)MEMBRANE# OR PEM
L6         18094 SEA FILE=HCAPLUS (RESTORE# OR RESTORING OR REGENERAT? OR
                 RE(W)(STORE# OR STORING OR GENERAT?))(5A)CELL#
L7          3909 SEA FILE=HCAPLUS L4 AND L5
L8            66 SEA FILE=HCAPLUS L7 AND L6
L9            25 SEA FILE=HCAPLUS L8 AND P/DT
L10            7 SEA FILE=HCAPLUS L9 AND (1907-2000)/PRY,AY
L11           41 SEA FILE=HCAPLUS L8 NOT L9
L12           24 SEA FILE=HCAPLUS L11 NOT (2000-2006)/PY
L13           31 SEA FILE=HCAPLUS L10 OR L12
L14       161952 SEA FILE=HCAPLUS (NEGATIVE OR NEG#)(A)ELECTRODE# OR
                 ANODE#
L15       199588 SEA FILE=HCAPLUS (POSITIVE OR POS#)(A)ELECTRODE# OR
                 CATHODE#
L16            4 SEA FILE=HCAPLUS L13 AND L14
L17            7 SEA FILE=HCAPLUS L13 AND L15
L18            8 SEA FILE=HCAPLUS L16 OR L17
L19           31 SEA FILE=HCAPLUS L13 OR L18
L30        16089 SEA FILE=COMPENDEX FUEL(W)CELL#
L31         2967 SEA FILE=COMPENDEX PROTON(W)EXCHANGE(W)MEMBRANE# OR PEM
L32         1065 SEA FILE=COMPENDEX (RESTORE# OR RESTORING OR REGENERAT?
                 OR RE(W)(STORE# OR STORING OR GENERAT?))(5A)CELL#
L33         2113 SEA FILE=COMPENDEX L30 AND L31
L34           39 SEA FILE=COMPENDEX L33 AND L32
L35        27299 SEA FILE=COMPENDEX (NEGATIVE OR NEG#)(A)ELECTRODE# OR
                 ANODE#
L36        41673 SEA FILE=COMPENDEX (POSITIVE OR POS#)(A)ELECTRODE# OR
                 CATHODE#
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L37            3 SEA FILE=COMPENDEX L34 AND L35
L38            3 SEA FILE=COMPENDEX L34 AND L36
L39            5 SEA FILE=COMPENDEX L37 OR L38
L40        20800 SEA FILE=JAPIO FUEL(W)CELL#
L41          113 SEA FILE=JAPIO PROTON(W)EXCHANGE(W)MEMBRANE# OR PEM
L42          506 SEA FILE=JAPIO (RESTORE# OR RESTORING OR REGENERAT? OR
                 RE(W)(STORE# OR STORING OR GENERAT?))(5A)CELL#
L43           76 SEA FILE=JAPIO L40 AND L41
L44            0 SEA FILE=JAPIO L43 AND L42
L45         8807 SEA FILE=JICST-EPLUS FUEL(W)CELL#
L46          311 SEA FILE=JICST-EPLUS PROTON(W)EXCHANGE(W)MEMBRANE# OR
                 PEM
L47         1904 SEA FILE=JICST-EPLUS (RESTORE# OR RESTORING OR REGENERAT?
                  OR RE(W)(STORE# OR STORING OR GENERAT?))(5A)CELL#
L48          126 SEA FILE=JICST-EPLUS L45 AND L46
L49            0 SEA FILE=JICST-EPLUS L48 AND L47
L50        12481 SEA FILE=INSPEC FUEL(W)CELL#
L51         3184 SEA FILE=INSPEC PROTON(W)EXCHANGE(W)MEMBRANE# OR PEM
L52          796 SEA FILE=INSPEC (RESTORE# OR RESTORING OR REGENERAT? OR
                 RE(W)(STORE# OR STORING OR GENERAT?))(5A)CELL#
L53         2400 SEA FILE=INSPEC L50 AND L51
L54           39 SEA FILE=INSPEC L53 AND L52
L55        25665 SEA FILE=INSPEC (NEGATIVE OR NEG#)(A)ELECTRODE# OR
                 ANODE#
L56        50833 SEA FILE=INSPEC (POSITIVE OR POS#)(A)ELECTRODE# OR
                 CATHODE#
L57            3 SEA FILE=INSPEC L54 AND L55
L58            2 SEA FILE=INSPEC L54 AND L56
L59            5 SEA FILE=INSPEC L57 OR L58
L60           19 SEA FILE=HCAPLUS (WO2001-US30557/APPS OR US2001-965444/AP

L61           29 SEA FILE=HCAPLUS L19 NOT L60
L62           34 DUP REM L61 L39 L44 L49 L59 (5 DUPLICATES REMOVED)


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YOU HAVE REQUESTED DATA FROM FILE 'COMPENDEX, INSPEC, HCAPLUS' - CONTINUE?
 (Y)/N:y

L62  ANSWER 1 OF 34  COMPENDEX  COPYRIGHT 2006 EEI on STN   DUPLICATE 1
ACCESSION NUMBER:         2005(25):4009  COMPENDEX
TITLE:                    Enhancement of the performance and reliability
                          of CO poisoned PEM fuel
                          cells.
AUTHOR:                   Adams, W.A. (ESTCO Battery Management Inc.,
                          Ottawa, Ont. K2G 0G3, Canada); Blair, J.;
                          Bullock, K.R.; Gardner, C.L.
SOURCE:                   Journal of Power Sources v 145 n 1 Jul 4 2005
                          2005.p 55-61
                          CODEN: JPSODZ    ISSN: 0378-7753
PUBLICATION YEAR:         2005
DOCUMENT TYPE:            Journal
TREATMENT CODE:           Experimental
LANGUAGE:                 English
ABSTRACT:                 CO poisoning is a major issue when reformate is
                          used as a fuel in PEM fuel
                          cells. Normally, it is necessary to
                          reduce the CO to very low levels ([similar to]5
                          ppm) and to use CO tolerant catalysts, such as
                          Pt-Ru alloys. As an alternative approach, we
                          have studied the use of pulsed oxidation for the
                          regeneration of CO poisoned
```

cells. Results are presented for the **regeneration** of Pt and Pt-Ru **anodes** in a **PEM fuel cell** fed with CO concentrations as high as 10,000 ppm. The results show that periodic removal of CO from the catalyst surface by pulsed oxidation can increase the average cell potential and overall efficiency. Although use of pulsed techniques has been studied before, the careful control of each cell's voltage that this approach requires has limited its use in large **fuel cell** stacks. When uniform pulsing is done on a stack of **fuel cells** in series, the variations in voltage across the cells can limit the usefulness of this approach. A novel method that allows each cell in a stack to be separately pulsed under controlled conditions has been developed to overcome this problem. Weak or defective cells in a **fuel cell** stack can also be supplemented to enhance the power output and reliability of **fuel cells.** We present the results of experiments and calculations that quantify these benefits, specifically as they relate to **PEM fuel cells** operating on impure hydrogen produced by reforming fuels. $CPY 2005 Elsevier B.V. All rights reserved. 10 Refs.

CLASSIFICATION CODE: 702.2 Fuel Cells; 815.1.1 Organic Polymers; 817.1 Plastics Products; 804.2 Inorganic Compounds; 802.2 Chemical Reactions; 931.2 Physical Properties of Gases, Liquids and Solids

CONTROLLED TERM: ***Fuel cells**; Ruthenium; Reforming reactions; Surface properties; Catalysts; Electric potential; Platinum alloys; Polyelectrolytes; Carbon monoxide; Reliability; Oxidation

SUPPLEMENTARY TERM: **PEM fuel cell**; Pulsed oxidation; Cell potential; Reforming fuels

ELEMENT TERM: C*O; CO; C cp; cp; O cp; Pt*Ru; Pt sy 2; sy 2; Ru sy 2; Pt-Ru; Pt

L62 ANSWER 2 OF 34 INSPEC (C) 2006 IEE on STN

ACCESSION NUMBER: 2004:8215829 INSPEC

DOCUMENT NUMBER: A2005-03-8630G-007; B2005-02-8410G-009

TITLE: State-of-the-art and prospect of direct ethanol **fuel cell**

AUTHOR: Zhu Ke; Chen Yan-xi; Zhang Ji-yan (Sch. of Chem. Eng., Tianjin Univ., China)

SOURCE: Chinese Journal of Power Sources (March 2004), vol.28, no.3, p. 187-90, 14 refs.
CODEN: DIJIFT, ISSN: 1002-087X
SICI: 1002-087X(200403)28:3L.187:SPDE;1-J
Published by: Tianjin Inst. Power Sources, China

DOCUMENT TYPE: Journal

TREATMENT CODE: Theoretical

COUNTRY: China

LANGUAGE: Chinese

ABSTRACT: The research on PEMFC adopting pure hydrogen had been developing all the time and also the DMFC

was paid much attention to. However, hydrogen storage is not easy and methanol is poisonous. People tried to develop **fuel cells** which could utilize abundant, low poisonous and regenerative fuels just like ethanol. The mechanism for electrocatalytic oxidation of ethanol on platinum, **anode** electrocatalysts for DEFC, electrolyte membranes and their improvements, the **fuel cell** performances and their influence factors were reviewed. The characteristics of three types of **fuel cells** (PEMFC, DMFC and DEFC) which adopted pure hydrogen, methanol and ethanol respectively as fuels were compared. Future work should be focused on the improvement of **anode** electrocatalysts and electrolyte membranes

CLASSIFICATION CODE: A8630G Fuel cells; A8640K Hydrogen storage and technology; A8245 Electrochemistry and electrophoresis; B8410G Fuel cells

CONTROLLED TERM: catalysis; catalysts; electrochemical electrodes; electrolytes; hydrogen storage; platinum; **proton exchange membrane fuel cells**

SUPPLEMENTARY TERM: direct ethanol fuel cell; DEFC; proton exchange membrane fuel cells; PEMFC; direct methanol fuel cell; DMFC; hydrogen storage; regenerative fuels; electrocatalytic oxidation; platinum; anode electrocatalysts; electrolyte membranes; fuel cell performance; pure hydrogen; electrocatalysis mechanism

L62 ANSWER 3 OF 34 INSPEC (C) 2006 IEE on STN

ACCESSION NUMBER: 2005:8273770 INSPEC

DOCUMENT NUMBER: B2005-03-8410G-024

TITLE: Cost/benefit analyses of a new battery pack management technique for telecommunication applications: future directions with **fuel cell**/battery systems

AUTHOR: Adams, W.A.; Blair, J.D.; Bullock, K.R.; Gardner, C.L.; Laishui Li (ESTCO Battery Manage. Inc., Ottawa, Ont., Canada)

SOURCE: INTELEC 26th Annual International Telecommunications Energy Conference (IEEE Cat. No.04CH37562), 2004, p. 73-82 of xx+730 pp., 23 refs.
ISBN: 0 7803 8458 X
Price: 0-7803-8458-X/04/$20.00
Published by: IEEE, Piscataway, NJ, USA
Conference: INTELEC 26th Annual International Telecommunications Energy Conference, Chicago, IL, USA, 19-23 Sept. 2004
Sponsor(s): Power Electron. Soc. of the Inst. of Electr. and Electron. Eng

DOCUMENT TYPE: Conference; Conference Article

TREATMENT CODE: New Development; Practical

COUNTRY: United States

LANGUAGE: English

ABSTRACT: A new approach to battery pack and **fuel cell** management, the battery health manager-BHM® and the **fuel cell** health manager-FCHM®, both

cell-based techniques that manage power supplies without disrupting operations, was described at INTELEC 2002. Using the BHM, each cell (or module) in a battery pack can be cycled to up to a full-load discharge, and then smart charged, in a **regenerative** cycling process, to optimize **cell** capacity and life, without removing the cells from the battery string or compromising inter-cell connections. A historical database providing full state-of-health (SOH) information for backup battery packs is now available based on BHM® technology. In addition to conventional information such as float voltage and current, temperature and internal resistance, the database created by BHM® technologies is able to provide critical SOH information including voltage, current, and temperature for up to full discharge cycles on all the individual cells of the backup battery pack. A cost/benefit analysis of this powerful cell based technique for telecommunication applications is shown using this database as well as previously published data. A new concept, the **fuel cell** health management (FCHM®) technique, is applicable to **fuel cell** stack management. **Fuel cells** and **fuel cell** battery/hybrid systems are being considered for telecommunication applications. Because of the difficulty in storing hydrogen, in many **fuel cell** applications the hydrogen is produced chemically from fuel such as methanol or natural gas using a fuel reformer to strip out the hydrogen. In addition to hydrogen and carbon dioxide, reformates contain significant concentrations of carbon monoxide (CO) and H2S, catalyst poisons which degrade the **fuel cell** electrical output. Recent results for a **PEM fuel cell** operating on 100 ppm CO show however that there is a significant loss of overall efficiency when compared with results for pure hydrogen. As an alternative cheaper approach than current practices to dealing with hydrogen contaminants, we have applied pulsed oxidation for the removal of CO and **regeneration** of CO poisoned **cells** using a microprocessor-based **fuel cell** health manager. We will present results for the regeneration of Pt and Pt-Ru **anodes** in a **PEM fuel cell** fed with CO concentrations as high as 10,000 ppm (1% CO). The results of a cost/benefit analysis for the use of a FCHM® on a 4 kW **fuel cell** system are also presented

CLASSIFICATION CODE: B8410G Fuel cells; B1265F Microprocessors and microcomputers; B6210 Telecommunication applications

CONTROLLED TERM: battery management systems; carbon compounds;

cost-benefit analysis; electrochemical electrodes; hydrogen; microprocessor chips; oxidation; platinum; **proton exchange membrane fuel cells**; ruthenium; telecommunication services

SUPPLEMENTARY TERM: cost-benefit analyses; battery pack management technique; telecommunication applications; fuel cell-battery systems; battery health manager; anodes; microprocessor-based fuel cell health manager; INTELEC 2002; regenerative cycling process; cell capacity optimization; state-of-health information; backup battery packs; discharge cycles; fuel cell stack management; cell battery-hybrid systems; hydrogen storing; methanol; natural gas; fuel reformer; carbon dioxide; carbon monoxide; catalyst poisons; PEM fuel cell; hydrogen contaminants; pulsed oxidation; 4 kW; CO; Pt-Ru; H2S

CHEMICAL INDEXING: CO bin, C bin, O bin; PtRu bin, Pt bin, Ru bin; H2S bin, H2 bin, H bin, S bin

PHYSICAL PROPERTIES: power 4.0E+03 W

ELEMENT TERMS: O; Ru; Pt; S; H; C*O; CO; C cp; cp; O cp; H*S; H2S; H cp; S cp; Pt*Ru; Pt sy 2; sy 2; Ru sy 2; Pt-Ru

L62 ANSWER 4 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2003:118450 HCAPLUS

DOCUMENT NUMBER: 138:156309

ENTRY DATE: Entered STN: 14 Feb 2003

TITLE: Regenerative dryer device and method for water recovery primarily in the **cathode** side of a **proton exchange membrane fuel cell**

INVENTOR(S): Cargnelli, Joe; Ye, Jianming; Chen, Xuesong; Gopal, Ravi B.; Frank, David

PATENT ASSIGNEE(S): Hydrogenics Corporation, Can.

SOURCE: U.S. Pat. Appl. Publ., 22 pp., Cont.-in-part of U.S. Ser. No. 941,934.
CODEN: USXXCO

DOCUMENT TYPE: **Patent**

LANGUAGE: English

INT. PATENT CLASSIF.:
MAIN: H01M008-04

US PATENT CLASSIF.: 429026000; 429034000; 429013000

CLASSIFICATION: 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 47

FAMILY ACC. NUM. COUNT: 2

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2003031906	A1	20030213	US 2002-223706	20020820
US 6916567	B2	20050712		
WO 2001097307	A2	20011220	WO 2001-CA851	20010613

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     WO 2001097307        A3    20030501
         W:  AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH,
             CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE,
             GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,
             LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO,
             NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT,
             TZ, UA, UG, US, UZ, VN, YU, ZA, ZW
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             GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI,
             CM, GA, GN, GW, ML, MR, NE, SN, TD, TG
     CA 2456929           AA    20030306   CA 2002-2456929
                                                                  200208
                                                                  20
     WO 2003019080        A1    20030306   WO 2002-CA1286
                                                                  200208
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             GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ,
             LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ,
             NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ,
             TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW,
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             MC, NL, PT, SE, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
             GW, ML, MR, NE, SN, TD, TG
     EP 1421320           A1    20040526   EP 2002-754056
                                                                  200208
                                                                  20
         R:  AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,
             PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, SK
     CN 1549912           A     20041124   CN 2002-817092
                                                                  200208
                                                                  20
     JP 2005500504        T2    20050106   JP 2003-523903
                                                                  200208
                                                                  20
PRIORITY APPLN. INFO.:                     WO 2001-CA851       A2
                                                                  200106
                                                                  13
                                           US 2001-941934      A2
                                                                  200108
                                                                  30
                                           US 2000-592644      A1
                                                                  200006
                                                                  13
                                                        <--
                                           WO 2002-CA1286      W
                                                                  200208
                                                                  20

PATENT CLASSIFICATION CODES:
 PATENT NO.      CLASS  PATENT FAMILY CLASSIFICATION CODES
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 US 2003031906   ICM    H01M008-04
                 INCL   429026000; 429034000; 429013000
                 IPCI   H01M0008-04 [ICM,7]
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	IPCR	F24F0003-12 [I,C]; F24F0003-14 [I,A]; F28D0017-00 [I,C]; F28D0017-04 [I,A]; H01M0008-04 [I,A]; H01M0008-04 [I,C]
	NCL	429/026.000
	ECLA	F24F003/14C; F28D017/04; H01M008/04C2E
WO 2001097307	IPCI	H01M0008-04 [ICM,7]
	IPCR	H01M0008-04 [I,A]; H01M0008-04 [I,C]; H01M0008-10 [I,A]; H01M0008-10 [I,C]
	ECLA	H01M008/04C2E2; H01M008/10B
		<--
CA 2456929	IPCI	F24F0003-14 [ICM,7]; B01D0053-04 [ICS,7]; F28D0017-04 [ICS,7]
WO 2003019080	IPCI	F24F0003-14 [ICM,7]; B01D0053-04 [ICS,7]; F28D0017-04 [ICS,7]
	IPCR	F24F0003-12 [I,C]; F24F0003-14 [I,A]; F28D0017-00 [I,C]; F28D0017-04 [I,A]; H01M0008-04 [I,A]; H01M0008-04 [I,C]
	ECLA	F24F003/14C; F28D017/04; H01M008/04C2E
EP 1421320	IPCI	F24F0003-14 [ICM,7]; B01D0053-04 [ICS,7]; F28D0017-04 [ICS,7]
	IPCR	F24F0003-12 [I,C]; F24F0003-14 [I,A]; F28D0017-00 [I,C]; F28D0017-04 [I,A]; H01M0008-04 [I,A]; H01M0008-04 [I,C]
CN 1549912	IPCI	F24F0003-14 [ICM,7]; B01D0053-04 [ICS,7]; F28D0017-04 [ICS,7]
JP 2005500504	IPCI	F24F0003-14 [ICM,7]; B01D0053-26 [ICS,7]
	FTERM	3L053/BC01; 3L053/BC05; 4D052/AA08; 4D052/CB01; 4D052/DA01; 4D052/DB02; 4D052/HA21

ABSTRACT:
The invention regards a **fuel cell** system and method for recovering moisture from an outgoing oxidant stream and humidifying an incoming oxidant stream in a **fuel cell.** A plurality of dryers is used to recover moisture from an outgoing oxidant stream from the **fuel cell** and to humidify an incoming oxidant stream for the **fuel cell.** The **fuel** ***cell*** comprises an **anode** for receiving fuel and a ***cathode*** for receiving the incoming oxidant stream and discharging the outgoing oxidant stream, and an electrolyte between the **anode** and the **cathode.** The moisture recovery and humidification involves (i) intermittently switching each dryer in the plurality of dryers into and out of one of a first mode of operation for recovering moisture from the outgoing oxidant stream and a second mode of operation for humidifying the incoming oxidant stream such that during use at least one dryer is in the first mode of operation and at least one dryer is in the second mode of operation; (ii) directing the outgoing oxidant stream from the **cathode** through at least one dryer in the first mode of operation to recover moisture from the outgoing oxidant stream; and (iii) directing the incoming oxidant stream through at least one dryer in the second mode of operation to humidify the incoming oxidant stream with moisture.

SUPPL. TERM: regenerative dryer water recovery **cathode** side **fuel cell**

INDEX TERM: Drying apparatus
Electric switches
Fuel cell cathodes
(**regenerative** dryer device and method for water recovery primarily in **cathode** side of **proton exchange membrane fuel cell**)

INDEX TERM: Water vapor
(removal; regenerative dryer device and method for

water recovery primarily in **cathode** side of **proton exchange membrane fuel cell**)

INDEX TERM: **Fuel cells**
(solid electrolyte; **regenerative** dryer device and method for water recovery primarily in **cathode** side of **proton exchange membrane fuel cell**)

INDEX TERM: 7732-18-5, Water, uses
ROLE: MOA (Modifier or additive use); USES (Uses)
(humidification with; regenerative dryer device and method for water recovery primarily in **cathode** side of **proton exchange membrane fuel cell**)

REFERENCE COUNT: 14 THERE ARE 14 CITED REFERENCES AVAILABLE FOR THIS RECORD.

REFERENCE(S):

(1) Anon; JP 10064569 1998 HCAPLUS
(2) Cargnelli; US 20040038100 A1 2004 HCAPLUS
(3) Chow; US 5935726 A 1999 HCAPLUS
(4) Dighe; US 4362789 A 1982 HCAPLUS
(5) DuBose; US 6013385 A 2000 HCAPLUS
(6) Frank; US 6436563 B1 2002 HCAPLUS
(7) Katz; US 4259302 A 1981 HCAPLUS
(8) Marron; US 4093435 A 1978
(9) Merritt; US 5441821 A 1995 HCAPLUS
(10) Perry; US 5316869 A 1994
(11) Steele; US 4924934 A 1990
(12) Steele; US 6155334 A 2000
(13) Strasser; US 5478662 A 1995 HCAPLUS
(14) Strasser; US 5543238 A 1996 HCAPLUS

L62 ANSWER 5 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2002:90416 HCAPLUS
DOCUMENT NUMBER: 136:153856
ENTRY DATE: Entered STN: 01 Feb 2002
TITLE: Compression member for **proton exchange membrane** electrochemical cell system
INVENTOR(S): Molter, Trent M.; Dristy, Mark E.
PATENT ASSIGNEE(S): Proton Energy Systems, USA
SOURCE: PCT Int. Appl., 34 pp.
CODEN: PIXXD2
DOCUMENT TYPE: **Patent**
LANGUAGE: English
INT. PATENT CLASSIF.:
MAIN: H01M
CLASSIFICATION: 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002009208	A2	20020131	WO 2001-US22845 <--	20010720
WO 2002009208	A3	20030313		

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH,
CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE,
GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO,
NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT,
TZ, UA, UG, UZ, VN, YU, ZA, ZW
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH,
CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE,
TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN,
TD, TG

AU 2001077017 A5 20020205 AU 2001-77017 20010720 <--
US 2002022173 A1 20020221 US 2001-909846 20010720 <--
US 6855450 B2 20050215
EP 1314212 A2 20030528 EP 2001-954796 20010720 <--

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,
PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR

US 2004224213 A1 20041111 US 2004-869246 20040615 <--

PRIORITY APPLN. INFO.: US 2000-219526P P 20000720 <--
US 2001-909846 A3 20010720
WO 2001-US22845 W 20010720

PATENT CLASSIFICATION CODES:

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 2002009208	ICM	H01M
	IPCI	H01M [ICM,7]
	IPCR	H01M [I,S]; H01M0002-00 [I,A]; H01M0002-00 [I,C]; H01M0008-02 [I,A]; H01M0008-02 [I,C]; H01M0008-24 [I,A]; H01M0008-24 [I,C]
	ECLA	C25B009/20; H01M008/02C; H01M008/02D2; H01M008/24C2; H01M008/24D2 <--
AU 2001077017	ECLA	C25B009/20; H01M008/02C; H01M008/02D2; H01M008/24C2; H01M008/24D2 <--
US 2002022173	IPCI	H01M0008-02 [ICM,7]; C25B0001-10 [ICS,7]
	IPCR	C25B0001-00 [I,C]; C25B0001-10 [I,A]; C25B0009-00 [I,A]; C25B0009-00 [I,C]; H01M0002-08 [I,A]; H01M0002-08 [I,C]; H01M0008-02 [I,A]; H01M0008-02 [I,C]
	NCL	429/037.000 <--

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EP 1314212       IPCI   H01M0002-00 [ICM,7]
                 IPCR   H01M [I,S]; H01M0002-00 [I,A]; H01M0002-00 [I,C];
                        H01M0008-02 [I,A]; H01M0008-02 [I,C]; H01M0008-24
                        [I,A]; H01M0008-24 [I,C]
                 ECLA   C25B009/20; H01M008/02C; H01M008/02D2;
                        H01M008/24C2; H01M008/24D2
                                                          <--
US 2004224213    IPCI   H01M0008-02 [ICM,7]; H01M0002-08 [ICS,7]
                 IPCR   C25B0001-00 [I,C]; C25B0001-10 [I,A]; C25B0009-00
                        [I,A]; C25B0009-00 [I,C]; H01M0002-08 [I,A];
                        H01M0002-08 [I,C]; H01M0008-02 [I,A]; H01M0008-02
                        [I,C]
                 NCL    429/037.000
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ABSTRACT:
A compression member for an electrochem. cell stack includes a first surface including a plurality of raised portions, a second surface including a substantially flat surface, and an edge defined by the first surface and the second surface. The plurality of raised portions is aligned to define a plurality of receiving areas. The plurality of raised portions and the plurality of received areas are configured, such application of an axial compressive force spreads the plurality of raised portions into the plurality of receiving areas. The edge includes a portion configured to receive an electrochem. cell terminal there-through. The compression member is formed of elec. nonconductive materials.

SUPPL. TERM: **proton exchange membrane** electrochem cell system; **fuel cell proton exchange membrane** system; electrolyzer **proton exchange membrane** system

INDEX TERM: Compression
Electrolytic cells
(compression member for **proton exchange membrane** electrochem. cell system)

INDEX TERM: EPDM rubber
Fluoro rubber
Rubber, uses
Silicone rubber, uses
ROLE: TEM (Technical or engineered material use); USES (Uses)
(compression member for **proton exchange membrane** electrochem. cell system)

INDEX TERM: **Fuel cells**
(**regenerative fuel cells**; compression member for **proton exchange membrane** electrochem. cell system)

L62 ANSWER 6 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2002:928092 HCAPLUS
DOCUMENT NUMBER: 138:6478
ENTRY DATE: Entered STN: 06 Dec 2002
TITLE: Apparatus and method for maintaining compression of the active area in an electrochemical cell
INVENTOR(S): Molter, Trent M.; Byron, Robert H.; Grant, Geoffrey; Moulthrop, Lawrence C.; Ortiz, Doug; Shiepe, Jason K.; Skoczylas, Thomas; Speranza, A. John

PATENT ASSIGNEE(S): USA
SOURCE: U.S. Pat. Appl. Publ., 17 pp., Cont.-in-part of U.S. Ser. No. 965,679.
CODEN: USXXCO
DOCUMENT TYPE: **Patent**
LANGUAGE: English
INT. PATENT CLASSIF.:
MAIN: H01M008-02
SECONDARY: H01M008-10
US PATENT CLASSIF.: 429037000; 429030000; 429066000
CLASSIFICATION: 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72
FAMILY ACC. NUM. COUNT: 2
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.		DATE
US 2002182472	A1	20021205	US 2002-137991		20020503 <--
US 2003104263	A1	20030605	US 2001-965679		20010927 <--

PRIORITY APPLN. INFO.:			
	US 2000-235629P	P	20000927 <--
	US 2000-235871P	P	20000927 <--
	US 2000-235872P	P	20000927 <--
	US 2001-965679	A2	20010927

PATENT CLASSIFICATION CODES:

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 2002182472	ICM	H01M008-02
	ICS	H01M008-10
	INCL	429037000; 429030000; 429066000
	IPCI	H01M0008-02 [ICM,7]; H01M0008-10 [ICS,7]
	IPCR	H01M0002-20 [I,A]; H01M0002-20 [I,C]; H01M0008-02 [I,A]; H01M0008-02 [I,C]; H01M0008-10 [N,A]; H01M0008-10 [N,C]; H01M0008-24 [N,A]; H01M0008-24 [N,C]; H01M0010-04 [N,A]; H01M0010-04 [N,C]
	NCL	429/037.000
	ECLA	H01M002/20; H01M008/02C; H01M008/02D; H01M008/02H <--
US 2003104263	IPCI	H01M0008-10 [ICM,7]; H01M0002-08 [ICS,7]
	IPCR	H01M0002-20 [I,A]; H01M0002-20 [I,C]; H01M0008-02 [I,A]; H01M0008-02 [I,C]; H01M0008-10 [N,A]; H01M0008-10 [N,C]; H01M0008-24 [N,A]; H01M0008-24 [N,C]; H01M0010-04 [N,A]; H01M0010-04 [N,C]

NCL 429/037.000
ECLA H01M002/20; H01M008/02C; H01M008/02D; H01M008/02H
<--

ABSTRACT:
An electrochem. cell includes a first electrode, a second electrode, a ***proton*** **exchange membrane** disposed between and in intimate contact with the electrodes, a pressure pad disposed in elec. communication with the first electrode, and a pressure distributor disposed adjacent to the pressure pad. The pressure pad may be an elec. conductive sheet and an elastomeric material disposed at the elec. conductive sheet. The pressure distributor may be a screen mesh. A method of distributing a load on a pressure pad includes disposing a screen mesh at an elastomeric material of the pressure pad and pressing the screen mesh into the elastomeric material.

SUPPL. TERM: an electrochem cell active area compression maintenance; **fuel cell** active area compression maintenance; electrolysis cell active area compression maintenance

INDEX TERM: Compression
Electrochemical cells
Electrolytic cells
Fuel cells
(app. and method for maintaining compression of active area in electrochem. cell)

INDEX TERM: Rubber, uses
ROLE: TEM (Technical or engineered material use); USES (Uses)
(app. and method for maintaining compression of active area in electrochem. cell)

INDEX TERM: **Fuel cells**
(**regenerative fuel cells**; app. and method for maintaining compression of active area in electrochem. cell)

INDEX TERM: **Fuel cells**
(solid electrolyte; app. and method for maintaining compression of active area in electrochem. cell)

L62 ANSWER 7 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2002:123458 HCAPLUS
DOCUMENT NUMBER: 136:170306
ENTRY DATE: Entered STN: 15 Feb 2002
TITLE: Integrated apparatus with water deionization system coupled to an electrolytic hydrogen generator and a **fuel cell** power plant
INVENTOR(S): Merida-Donis, Walter Roberto
PATENT ASSIGNEE(S): Can.
SOURCE: U.S. Pat. Appl. Publ., 30 pp.
CODEN: USXXCO
DOCUMENT TYPE: **Patent**
LANGUAGE: English
INT. PATENT CLASSIF.:
MAIN: C02F001-46
SECONDARY: C25B001-04; C25B001-06; H01M008-06; H01M008-22
US PATENT CLASSIF.: 204551000
CLASSIFICATION: 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 61, 72
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.		DATE
US 2002017463	A1	20020214	US 2001-875281		20010605 <--
US 6569298	B2	20030527			
US 2004013918	A1	20040122	US 2003-440006		20030515 <--
PRIORITY APPLN. INFO.:			US 2000-209518P	P	20000605 <--
			US 2001-875281	A1	20010605

PATENT CLASSIFICATION CODES:

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 20020017463	ICM	C02F001-46
	ICS	C25B001-04; C25B001-06; H01M008-06; H01M008-22
	INCL	204551000
	IPCI	C02F0001-46 [ICM,7]; C25B0001-04 [ICS,7]; C25B0001-06 [ICS,7]; H01M0008-06 [ICS,7]; H01M0008-22 [ICS,7]
	IPCR	C02F0001-461 [N,A]; C02F0001-461 [N,C]; C02F0001-469 [I,A]; C02F0001-469 [I,C]; C25B0001-00 [I,C]; C25B0001-04 [I,A]; H01M0008-04 [I,A]; H01M0008-04 [I,C]; H01M0008-06 [I,A]; H01M0008-06 [I,C]; H01M0008-18 [I,A]; H01M0008-18 [I,C]; H01M0016-00 [N,A]; H01M0016-00 [N,C]
	NCL	204/551.000
	ECLA	C02F001/469B; C25B001/04; H01M008/04C2; H01M008/06B4; H01M008/18C <--
US 2004013918	IPCI	H01M0008-18 [ICM,7]; H01M0008-10 [ICS,7]; H01M0008-04 [ICS,7]; C25C0001-02 [ICS,7]
	IPCR	C02F0001-461 [N,A]; C02F0001-461 [N,C]; C02F0001-469 [I,A]; C02F0001-469 [I,C]; C25B0001-00 [I,C]; C25B0001-04 [I,A]; H01M0008-04 [I,A]; H01M0008-04 [I,C]; H01M0008-06 [I,A]; H01M0008-06 [I,C]; H01M0008-18 [I,A]; H01M0008-18 [I,C]; H01M0016-00 [N,A]; H01M0016-00 [N,C]
	NCL	429/021.000
	ECLA	C02F001/469B; C25B001/04; H01M008/04C2; H01M008/06B4; H01M008/18C <--

ABSTRACT:
The present invention is directed to an app. and method for deionization and hydrogen fuel prodn. in a fuel generation mode, and electricity prodn. in a power generation mode. In one embodiment, a capacitive deionization (CDI) device receives water and elec. energy to produce deionized water that is transferred to a **proton** ***exchange*** **membrane** electrolysis (PEME) device to produce hydrogen fuel by electrolysis. A storage system receives the hydrogen. The hydrogen is transferred from the storage system to a **proton** ***exchange*** **membrane fuel cell** (PEMFC) device that produces elec. energy. In another embodiment, the PEME and

the PEMFC are functionally combined in a unitary **regenerative** ***fuel*** **cell** (URFC). In still another embodiment, a humidification unit and the CDI are functionally combined. In yet another embodiment, a CDI, URFC and the humidification unit are combined in a single unitary assembly.

SUPPL. TERM: water deionization system coupled electrolytic hydrogen generator; **fuel cell** power plant water deionization system coupled

INDEX TERM: Aerogels
(carbon; integrated app. with water deionization system coupled to electrolytic hydrogen generator and **fuel cell** power plant)

INDEX TERM: Water purification
(deionization; integrated app. with water deionization system coupled to electrolytic hydrogen generator and **fuel cell** power plant)

INDEX TERM: Power
(generation; integrated app. with water deionization system coupled to electrolytic hydrogen generator and **fuel cell** power plant)

INDEX TERM: Compressors
Electric vehicles
Heat exchangers
(integrated app. with water deionization system coupled to electrolytic hydrogen generator and **fuel cell** power plant)

INDEX TERM: Hydrides
ROLE: TEM (Technical or engineered material use); USES (Uses)
(integrated app. with water deionization system coupled to electrolytic hydrogen generator and **fuel cell** power plant)

INDEX TERM: Electrolytic cells
(membrane, proton exchange; integrated app. with water deionization system coupled to electrolytic hydrogen generator and **fuel cell** power plant)

INDEX TERM: **Fuel cells**
(power plants; integrated app. with water deionization system coupled to electrolytic hydrogen generator and **fuel cell** power plant)

INDEX TERM: **Fuel cells**
(**regenerative fuel cells**; integrated app. with water deionization system coupled to electrolytic hydrogen generator and **fuel cell** power plant)

INDEX TERM: 7440-44-0, Carbon, uses
ROLE: TEM (Technical or engineered material use); USES (Uses)
(aerogel; integrated app. with water deionization system coupled to electrolytic hydrogen generator and **fuel cell** power plant)

INDEX TERM: 1333-74-0P, Hydrogen, uses
ROLE: PEP (Physical, engineering or chemical process); PYP (Physical process); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); PROC (Process); USES (Uses)

(integrated app. with water deionization system coupled to electrolytic hydrogen generator and **fuel cell** power plant)

INDEX TERM: 7732-18-5, Water, reactions
ROLE: RCT (Reactant); RACT (Reactant or reagent)
(integrated app. with water deionization system coupled to electrolytic hydrogen generator and **fuel cell** power plant)

INDEX TERM: 7782-44-7P, Oxygen, uses
ROLE: SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(integrated app. with water deionization system coupled to electrolytic hydrogen generator and **fuel cell** power plant)

L62 ANSWER 8 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2002:347200 HCAPLUS
DOCUMENT NUMBER: 136:357427
ENTRY DATE: Entered STN: 09 May 2002
TITLE: Regeneration of CO-poisoned HT-**PEM** **fuel cells**
INVENTOR(S): Brueck, Rolf; Grosse, Joachim; Poppinger, Manfred; Reizig, Meike
PATENT ASSIGNEE(S): Siemens A.-G., Germany; Emitec Gesellschaft fuer Emissionstechnologie m.b.H.
SOURCE: Ger. Offen., 6 pp.
CODEN: GWXXBX
DOCUMENT TYPE: **Patent**
LANGUAGE: German
INT. PATENT CLASSIF.:
MAIN: H01M008-04
SECONDARY: H01M008-22
CLASSIFICATION: 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
DE 10053851	A1	20020508	DE 2000-10053851 <--	20001030
WO 2002037591	A1	20020510	WO 2001-DE4103 <--	20011030

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
AU 2002015835	A5	20020515	AU 2002-15835	200110

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    CA 2427133          AA     20030428    CA 2001-2427133
                                                                    200110
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    EP 1336213          A1     20030820    EP 2001-993032
                                                                    200110
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                                                   <--
        R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,
            PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR
    JP 2004513486       T2     20040430    JP 2002-540233
                                                                    200110
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    US 2003203248       A1     20031030    US 2003-426822
                                                                    200304
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PRIORITY APPLN. INFO.:                     DE 2000-10053851    A
                                                                    200010
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                                           WO 2001-DE4103      W
                                                                    200110
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PATENT CLASSIFICATION CODES:
 PATENT NO.      CLASS  PATENT FAMILY CLASSIFICATION CODES
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 DE 10053851     ICM    H01M008-04
                 ICS    H01M008-22
                 IPCI   H01M0008-04 [ICM,7]; H01M0008-22 [ICS,7]
                 IPCR   H01M0008-04 [I,A]; H01M0008-04 [I,C]; H01M0008-06
                        [N,A]; H01M0008-06 [N,C]
                 ECLA   H01M008/04C2F
                                                   <--
 WO 2002037591   IPCI   H01M0008-04 [ICM,7]
                 IPCR   H01M0008-04 [I,A]; H01M0008-04 [I,C]; H01M0008-06
                        [N,A]; H01M0008-06 [N,C]
                 ECLA   H01M008/04C2F
                                                   <--
 AU 2002015835   IPCI   H01M0008-04 [ICM,7]
                                                   <--
 CA 2427133      IPCI   H01M0008-04 [ICM,7]
                 IPCR   H01M0008-04 [I,A]; H01M0008-04 [I,C]; H01M0008-06
                        [N,A]; H01M0008-06 [N,C]
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 EP 1336213      IPCI   H01M0008-04 [ICM,7]
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 JP 2004513486   IPCI   H01M0008-04 [ICM,7]; H01M0008-10 [ICS,7]
                 FTERM  5H026/AA06; 5H027/AA06; 5H027/KK54; 5H027/MM26
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 US 2003203248   IPCI   H01M0008-10 [ICM,7]; H01M0008-04 [ICS,7];
                        H01M0008-06 [ICS,7]
                 IPCR   H01M0008-04 [I,A]; H01M0008-04 [I,C]; H01M0008-06
                        [N,A]; H01M0008-06 [N,C]
                 NCL    429/013.000
                 ECLA   H01M008/04C2F
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ABSTRACT:
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The procedure for the regeneration of CO-poisoned high temp.-polymer electrolyte membrane (HT-**PEM**) **fuel cell** electrodes is carried out by (1) cold starting of the HT-**PEM** ***fuel*** **cell**, (2) operating in a pulse mode for a defined period during heating of the **fuel cell**, and (3) ***regeneration*** of the CO-loaded electrodes. The regeneration is carried out at 60-300°, preferably 120-200°. The HT-***PEM*** **fuel cells** are more resistance to CO poisoning than the **PEM fuel cells** operating at room temps.

SUPPL. TERM: **fuel cell** electrode carbon monoxide **regeneration**
INDEX TERM: **Fuel cell** electrodes
(**regeneration** of CO-poisoned HT-**PEM fuel cells**)
INDEX TERM: **Fuel cells**
(**regenerative fuel cells; regeneration** of CO-poisoned HT-**PEM fuel cells**)
INDEX TERM: 630-08-0, Carbon monoxide, processes
ROLE: POL (Pollutant); REM (Removal or disposal); OCCU (Occurrence); PROC (Process)
(regeneration of CO-poisoned HT-**PEM fuel cells**)

L62 ANSWER 9 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1999:583988 HCAPLUS
DOCUMENT NUMBER: 131:187320
ENTRY DATE: Entered STN: 17 Sep 1999
TITLE: **Regenerative** micro-**fuel cells** and electrolyzers
AUTHOR(S): Kimble, Michael C.; Anderson, Everett B.; Woodman, Alan S.; Jayne, Karen D.
CORPORATE SOURCE: Physical Sciences Inc., Andover, MA, 01810-1077, USA
SOURCE: Proceedings of the Intersociety Energy Conversion Engineering Conference (1999), 34th, 503-508
CODEN: PIECDE; ISSN: 0146-955X
PUBLISHER: Society of Automotive Engineers
DOCUMENT TYPE: Journal; (computer optical disk)
LANGUAGE: English
CLASSIFICATION: 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72

ABSTRACT:
A novel reversible **proton exchange membrane** ***fuel*** **cell** system that is based upon micro-sized membrane and electrode assemblies is discussed. The resulting micro-***fuel*** **cell** has a reduced size and mass due to an improved design of the bipolar plates and current collectors. Bipolar plates often contribute over 75% of the **fuel cell** stack mass and vol. in traditional **fuel cell** and electrolyzer designs that results in power densities near 0.1 kW/kg and 0.1 kW/L. The micro-sized membrane and electrodes allow us to minimize the size of the gas-channels that feed reactants to the electrodes. The micro-design approach minimizes stack features resulting in power densities >1 kW/L and sp. power densities >1 kW/kg.

SUPPL. TERM: **proton exchange membrane**

fuel cell regenerative;
electrolyzer **proton exchange**
membrane regenerative
INDEX TERM: Electrolytic **cells**
Fuel cells
(**proton exchange**
membrane; development of
regenerative micro-sized **fuel**
cells and electrolyzers)

L62 ANSWER 10 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1999:332135 HCAPLUS
DOCUMENT NUMBER: 131:47093
ENTRY DATE: Entered STN: 31 May 1999
TITLE: Bifunctional electrodes with a thin catalyst layer for 'unitized' **proton exchange membrane regenerative fuel cell**
AUTHOR(S): Shao, Zhigang; Yi, Baolian; Han, Ming
CORPORATE SOURCE: Dalian Institute of Chemical Physics, Chinese Academy of Sciences, Dalian, 116023, Peop. Rep. China
SOURCE: Journal of Power Sources (1999), 79(1), 82-85
CODEN: JPSODZ; ISSN: 0378-7753
PUBLISHER: Elsevier Science S.A.
DOCUMENT TYPE: Journal
LANGUAGE: English
CLASSIFICATION: 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72

ABSTRACT:
A bifunctional electrode structure for a unitized **proton** ***exchange*** **membrane regenerative fuel** ***cell*** has been developed. The electrode has only a thin catalyst layer; it reduces the loading of the catalyst to 0.4 mg cm-2, and minimizes mass transport and ohmic limitations. A satisfactory performance of a unitized **proton exchange** ***membrane*** **fuel cell** is achieved with this electrode structure; 50 wt.% Pt + 50 wt.% IrO2 is a good bifunctional catalyst for the oxygen electrode. Examn. of this catalyst by transmission electron microscopy and of the electrode by SEM is reported.

SUPPL. TERM: **proton exchange membrane regenerative fuel cell**
INDEX TERM: **Fuel cell** electrodes
(bifunctional electrodes with thin catalyst layer for unitized **proton exchange membrane regenerative fuel cell**)
INDEX TERM: Polyoxyalkylenes, uses
ROLE: DEV (Device component use); USES (Uses)
(fluorine- and sulfo-contg., ionomers; bifunctional electrodes with thin catalyst layer for unitized **proton exchange membrane regenerative fuel cell**)
INDEX TERM: Polyoxyalkylenes, uses
ROLE: DEV (Device component use); USES (Uses)
(fluorine-contg., sulfo-contg., ionomers; bifunctional electrodes with thin catalyst layer for unitized **proton exchange membrane regenerative fuel cell**)

INDEX TERM: Fluoropolymers, uses
Fluoropolymers, uses
ROLE: DEV (Device component use); USES (Uses)
(polyoxyalkylene-, sulfo-contg., ionomers; bifunctional electrodes with thin catalyst layer for unitized **proton exchange membrane regenerative fuel cell**)

INDEX TERM: Ionomers
ROLE: DEV (Device component use); USES (Uses)
(polyoxyalkylenes, fluorine- and sulfo-contg.; bifunctional electrodes with thin catalyst layer for unitized **proton exchange membrane regenerative fuel cell**)

INDEX TERM: **Fuel cells**
(**regenerative fuel cells**; bifunctional electrodes with thin catalyst layer for unitized **proton exchange membrane regenerative fuel cell**)

INDEX TERM: 7440-06-4, Platinum, uses 12030-49-8, Iridium oxide
ROLE: CAT (Catalyst use); DEV (Device component use); USES (Uses)
(bifunctional electrodes with thin catalyst layer for unitized **proton exchange membrane regenerative fuel cell**)

INDEX TERM: 77950-55-1, Nafion 115
ROLE: DEV (Device component use); USES (Uses)
(bifunctional electrodes with thin catalyst layer for unitized **proton exchange membrane regenerative fuel cell**)

REFERENCE COUNT: 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD.

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(2) Baldwin, R; J Power Sources 1990, V29, P399 HCAPLUS
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(4) Swette, L; J Power Sources 1994, V47, P345
(5) Warshay, M; J Power Sources 1990, V29, P193 HCAPLUS
(6) Wilson, M; Electrochim Acta 1995, V40, P355 HCAPLUS
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L62 ANSWER 11 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1999:47370 HCAPLUS
DOCUMENT NUMBER: 130:112631
ENTRY DATE: Entered STN: 25 Jan 1999
TITLE: Research of reversible **proton exchange membrane regenerative fuel cells**
AUTHOR(S): Shao, Zhigang; Yi, Baolian; Han, Ming
CORPORATE SOURCE: Dalian Inst. Chem. Phys., CSC, Dalian, 116023, Peop. Rep. China
SOURCE: Dianhuaxue (1998), 4(4), 444-448
CODEN: DIANFX; ISSN: 1006-3471
PUBLISHER: Dianhuaxue Bianjibu

DOCUMENT TYPE: Journal
LANGUAGE: Chinese
CLASSIFICATION: 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ABSTRACT:
We report the results of our studies on **regenerative** ***proton*** **exchange membrane fuel** ***cell*** (RPEMRFC) catalysts, electrode prepn. and their performances. The Pt catalyst for the oxygen electrode was replaced by 60 wt% Pt + 40 w% IrO2 which reduces polarization by 0.2 V in a polymer ***proton*** **exchange membrane fuel** ***cell.*** The cycle performance of RPEMRFC was found to be manly effected by the stability of the diffusion layer of bifunctional oxygen electrode.

SUPPL. TERM: **fuel cell proton exchange membrane regenerative**

INDEX TERM: Catalysis
(electrocatalysis; research of reversible **proton exchange membrane regenerative fuel cells**)

INDEX TERM: **Fuel cells**
(**regenerative fuel cells**; research of reversible **proton exchange membrane regenerative fuel cells**)

INDEX TERM: 7440-06-4, Platinum, uses 12030-49-8, Iridium dioxide
ROLE: CAT (Catalyst use); USES (Uses)
(research of reversible **proton exchange membrane regenerative fuel cells**)

L62 ANSWER 12 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1997:651627 HCAPLUS
DOCUMENT NUMBER: 127:309457
ENTRY DATE: Entered STN: 15 Oct 1997
TITLE: Operation of the 25 kW NASA Lewis Research Center Solar **Regenerative Fuel Cell** Testbed Facility
AUTHOR(S): Voecks, Gerald E.; Rohatgi, Naresh K.; Jan, Darrell L.; Ferraro, Ned W.; Moore, Sonya H.; Warshay, Marvin; Prokopius, Paul R.; Edwards, H. Sam; Smith, Garyl D.
CORPORATE SOURCE: Jet Propulsion Laboratory, Pasadena, CA, 91109, USA
SOURCE: Proceedings of the Intersociety Energy Conversion Engineering Conference (1997), 32nd, 1543-1549
CODEN: PIECDE; ISSN: 0146-955X
PUBLISHER: Society of Automotive Engineers
DOCUMENT TYPE: Journal
LANGUAGE: English
CLASSIFICATION: 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ABSTRACT:
Assembly of the NASA Lewis Research Center (LeRC) Solar ***Regenerative*** **Fuel Cell** (RFC) Testbed Facility

has been completed and system testing has proceeded. This facility includes the integration of two 25 kW photovoltaic solar cell arrays, a 25 kW **proton exchange membrane (PEM**
) electrolysis unit, four 5 kW **PEM fuel cells**
, high pressure hydrogen and oxygen storage vessels, high purity water storage containers, and computer monitoring, control and data acquisition. The **fuel cell** and electrolyzer
subsystems' installation was carried out by the Jet Propulsion Lab. (JPL). The photovoltaic arrays and elec. interconnect to the electrolyzer were provided by the U.S. Navy/China Lake Naval Air Warfare Center. JPL is responsible for conducting the testing and operations at the LeRC facility. There are multiple objectives for this program. The near term objectives are: (1) design, assemble, and test the solar RFC power plant system to serve as a pre-prototype operational testbed facility; (2) evaluate performance criteria of the total system, subsystems, and components against various operational duty cycles; and (3) develop automation and controls commensurate with advanced system operating requirements. The long term objectives are: (1) develop a highly reliable, long life, highly efficient solar RFC power system for future manned space missions; and (2) demonstrate the dual use aspects of RFCs applicable to com. and military applications. The system description and initiation of system testing constitute Phase I of multiple activities planned to take place in the next few years. System modeling is being performed in parallel with the exptl. testing and will be used to det. the most efficient system design, from the standpoint of wt., vol. and cost of elec. power.

SUPPL. TERM: solar **regenerative fuel**
cell water electrolysis

INDEX TERM: Solar cells
(operation of NASA Lewis Research Center Solar **Regenerative Fuel Cell**
Testbed Facility)

INDEX TERM: **Fuel cells**
(**regenerative fuel cells**; operation of NASA Lewis Research Center Solar **Regenerative Fuel Cell** Testbed Facility)

INDEX TERM: 7732-18-5, Water, processes
ROLE: PEP (Physical, engineering or chemical process); PROC (Process)
(electrolysis; operation of NASA Lewis Research Center Solar **Regenerative Fuel Cell** Testbed Facility)

INDEX TERM: 1333-74-0P, Hydrogen, uses
ROLE: NUU (Other use, unclassified); PNU (Preparation, unclassified); PREP (Preparation); USES (Uses)
(operation of NASA Lewis Research Center Solar **Regenerative Fuel Cell**
Testbed Facility)

REFERENCE COUNT: 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS RECORD.

REFERENCE(S): (1) Edwards, H; "CdTe Terrestrial Modules as a Power Source for a Regenerative Fuel Cell Power Plant for Space Applications", IEEE Proceedings 1996
(2) Huff, J; Technology Assessment and Trade-off Study of Fuel Cell and Electrolyzer Technologies for the Project Pathfinder Energy Storage System 1991, LA-UR-90-3244
(3) Jan, D; "Thermal, Mass, and Power Interactions for Lunar Base Life Support and Power Systems",

SAE Technical Paper Series 932115 1993

L62 ANSWER 13 OF 34 HCAPLUS

ACCESSION NUMBER: 1998:21178 HCAPLUS
DOCUMENT NUMBER: 128:50616
ENTRY DATE: Entered STN: 15 Jan 1998
TITLE: Electrolyzer-based energy management: a means for optimizing the exploitation of variable renewable-energy resources in stand-alone applications

AUTHOR(S): Crockett, R. G. M.; Newborough, M.; Highgate, D. J.
CORPORATE SOURCE: School of Technology and Design, Nene College, Northampton, NN2 6JD, UK

SOURCE: Solar Energy (1997), 61(5), 293-302
CODEN: SRENA4; ISSN: 0038-092X
PUBLISHER: Elsevier Science Inc.
DOCUMENT TYPE: Journal
LANGUAGE: English
CLASSIFICATION: 52-1 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72

ABSTRACT:
Electrolyzer-based energy management (EBM) offers a versatile means for optimizing the process of harnessing energy supplies derived from variable and/or intermittent renewable resources, e.g. solar (photovoltaic), wind, wave and tidal. In general, EBM systems consist of an electrolyzer, water and gas (hydrogen and, optimally, oxygen) storage and management systems and a means of **(re-)generating** electricity, e.g. a **fuel cell.** Such systems achieve their management via energy conversion and storage, this operational principle being referred to as electricity supply-and-demand management (ESDM). Implementation of this principle offers significant advantages in the utilisation of variable and/or intermittent renewable resources, as it permits electricity generated during periods of high-availability/low-demand to be "time-shifted" for subsequent re-supply during periods of low-availability/high-demand. Furthermore, EBM systems have the important advantage over other ESDM systems that the stored form of energy is readily utilisable as a pollution-free gas supply for thermal end-uses. This reconversion route significantly enhances the overall energy-conversion efficiency. Electrolyzer and ***fuel*** **cells** based upon **proton-exchange** ***membrane*** technologies are preferred because these afford considerable operational advantages over any alternatives. In this paper these advantages are expanded upon and preliminary data based on these ideas are presented.

SUPPL. TERM: electrolyzer based energy management; renewable energy resource exploitation optimization
INDEX TERM: Electrolytic cells
Energy
Fuel cells
Optimization
Power
(electrolyzer-based energy management as a means for optimizing the exploitation of variable renewable-energy resources in stand-alone applications)
REFERENCE COUNT: 31 THERE ARE 31 CITED REFERENCES AVAILABLE FOR THIS RECORD.

REFERENCE(S): (1) Aldebert, P; Solid State Ionics 1989, V35, P3
(2) Allan, R; Proc Sixteenth BWEA Wind Energy Conf

1994
(3) Anahara, R; IEEE Proc 1993, V81(3), P399 HCAPLUS
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(5) Appleby, A; Energy 1986, V11, P137
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(9) Crockett, R; Appl Energy 1995, V51, P249 HCAPLUS
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(21) Maegaard, J; Wind Eng 1991, V15(2), P68
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(31) Wade, J; Integration of wind energy into the electrical utility system:an overview of the issues 1990

L62 ANSWER 14 OF 34 COMPENDEX COPYRIGHT 2006 EEI on STN
ACCESSION NUMBER: 1997(14):6470 COMPENDEX
TITLE: Novel unitized **regenerative proton exchange membrane fuel cell.**
AUTHOR: Murphy, O.J. (Lynntech, Inc, College Station, TX, USA); Cisar, A.J.; Gonzalez-Martin, A.; Salinas, C.E.; Simpson, S.F.
MEETING TITLE: Proceedings of the 1995 Conference on Space

Electrochemical Research and Technology.

MEETING LOCATION: Cleveland, OH, USA
MEETING DATE: 01 May 1995-03 May 1995
SOURCE: NASA Conference Publication n 3337 1996.p 83-99
CODEN: NACPDX
PUBLICATION YEAR: 1996
MEETING NUMBER: 45982
DOCUMENT TYPE: Journal
TREATMENT CODE: General Review; Experimental
LANGUAGE: English
ABSTRACT: A difficulty encountered in designing a unitized **regenerative proton exchange membrane (PEM) fuel cell** lies in the incompatibility of electrode structures and electrocatalyst materials optimized for either of the two functions (**fuel cell** or electrolyzer) with the needs of the other function.This difficulty is compounded in previous **regenerative fuel cell** designs by the fact that water, which is needed for proton conduction in the **PEM** during both modes of operation, is the reactant supplied to the **anode** in the electrolyzer mode of operation and the product formed at the **cathode** in the **fuel cell** mode.Drawbacks associated with existing **regenerative fuel cells** have been addressed.In a first innovation, electrodes function either as oxidation electrodes (hydrogen ionization or oxygen evolution) or as reduction electrodes (oxygen reduction or hydrogen evolution) in the **fuel cell** and electrolyzer modes, respectively.Control of liquid water within the **regenerative fuel cell** has been brought about by a second innovation.A novel **PEM** has been developed with internal channels that permit the direct access of water along the length of the membrane.Lateral diffusion of water along the polymer chains of the **PEM** provides the water needed at electrode/**PEM** interfaces. Fabrication of the novel single-**cell** unitized **regenerative fuel cell** and results obtained on testing it are presented.(Author abstract) 31 Refs.
CLASSIFICATION CODE: 655.1 Spacecraft (General); 802.1 Chemical Plants and Equipment; 801.4.1 Electrochemistry; 931.2 Physical Properties of Gases, Liquids and Solids; 817.1 Plastics Products; 802.2 Chemical Reactions
CONTROLLED TERM: *Spacecraft power supplies; Ionic conduction; Diffusion in solids; Polymeric membranes; Interfaces (materials); Redox reactions; **Fuel cells**; Catalysts; Ion exchange membranes; Electrochemical electrodes
SUPPLEMENTARY TERM: **Proton exchange membranes (PEM)**; **Regenerative fuel**

cells

L62 ANSWER 15 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1995:891210 HCAPLUS
DOCUMENT NUMBER: 123:291728
ENTRY DATE: Entered STN: 02 Nov 1995
TITLE: Internally humidified membranes for use in **fuel cells**
AUTHOR(S): Cisar, Alan; Gonzalez-Martin, Anuncia; Murphy, Oliver J.; Simpson, Stanley F.; Salinas, Carlos
CORPORATE SOURCE: Lynntech, Inc., College Station, TX, 77840, USA
SOURCE: Proceedings of the Intersociety Energy Conversion Engineering Conference (1995), 30th(Vol. 3), 205-10
CODEN: PIECDE; ISSN: 0146-955X
PUBLISHER: Society of Automotive Engineers
DOCUMENT TYPE: Journal
LANGUAGE: English
CLASSIFICATION: 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 72

ABSTRACT:
For optimal operation the membrane in a **proton exchange** ***membrane*** **(PEM) fuel cell** must be kept fully hydrated at all times. In most systems this is accomplished by the addn. of water as vapor or as a mist to at least the fuel stream, and frequently both of the gas streams being fed to the cell. This requires the inclusion of a humidifier in the system as either a portion of the cell stack or as an external component, increasing the size, wt., and complexity of the system. We have developed a membrane equipped with internal passages which allows water to be fed directly to the entire active area of the membrane, putting the water directly where it is needed. This produces a uniform water content throughout the membrane while at the same time reducing the size and wt. of the system by eliminating the need for a sep. humidification section. These new membranes are useful in most types of **fuel cells** and electrolyzers, but they have specific advantages for **regenerative** ***fuel*** **cells**, where the same structure must function as both a **fuel cell** and as an electrolyzer.

SUPPL. TERM: **fuel cell** internally humidified membrane
INDEX TERM: **Fuel cells**
(internally humidified membranes for use in **fuel cells**)
INDEX TERM: Polyoxyalkylenes, uses
ROLE: DEV (Device component use); USES (Uses)
(fluorine- and sulfo-contg., ionomers, internally humidified membranes for use in **fuel cells**)
INDEX TERM: Fluoropolymers
ROLE: DEV (Device component use); USES (Uses)
(polyoxyalkylene-, sulfo-contg., ionomers, internally humidified membranes for use in **fuel cells**)
INDEX TERM: Ionomers
ROLE: DEV (Device component use); USES (Uses)
(polyoxyalkylenes, fluorine- and sulfo-contg., internally humidified membranes for use in **fuel cells**)

L62 ANSWER 16 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1995:973282 HCAPLUS
DOCUMENT NUMBER: 124:61429
ENTRY DATE: Entered STN: 08 Dec 1995
TITLE: Development of a model of on-board PEMFC powered locomotive with a metal hydride cylinder
AUTHOR(S): Hasegawa, H.; Ohki, Y.
CORPORATE SOURCE: Prototype Manufacturing Center, Railway technical Research Institute, Tokyo, 185, Japan
SOURCE: Materials Research Society Symposium Proceedings (1995), 393(Materials for Electrochemical Energy Storage and Conversion-Batteries, Capacitors and Fuel Cells), 145-50
CODEN: MRSPDH; ISSN: 0272-9172
PUBLISHER: Materials Research Society
DOCUMENT TYPE: Journal
LANGUAGE: English
CLASSIFICATION: 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ABSTRACT:
This paper presents a phase-zero evaluation case of installing on-off-board hybrid powered elec. motor vehicle (EMV) in existing and new local line and reports development of a model locomotive powered by ***proton*** **exchange membrane fuel** ***cell*** (PEMFC). EMV such as elec. car and locomotive are a new conceptual EMV using hybrid power between off-board substation and on-board **regenerative fuel cell** power system with metal hydride stored hydrogen generated by water electrolyzer using off-board surplus power. In this study, a possibility to close power gap >30% in placing the new conceptual vehicle was estd. The locomotive is 110 cm long powered by a 20 W PEMFC configured with 20 cells and supplied with about 2 g hydrogen, from a cylinder of 100 g metal hydride, and natural convection air (O2). The locomotive (width 50 cm; height 50 cm; wt. 25.9 kg) has a permanent magnet motor with a rated power 38 W (12 V; 3 A), and ran on railway, that has a gauge of 126 mm, a length of 100 m. The train had acceleration 0.5 m/s, cruising speed 4.1 m/s at traction force of 15.8 N, and av. rolling friction of 5 N.

SUPPL. TERM: **proton exchange membrane fuel cell**; locomotive **fuel cell** powered model development
INDEX TERM: Locomotives
(development of model of on-board **proton exchange membrane fuel cell**-powered locomotive with metal hydride cylinder)
INDEX TERM: **Fuel cells**
(**proton exchange membrane**; development of model of on-board **proton exchange membrane fuel cell**-powered locomotive with metal hydride cylinder)

L62 ANSWER 17 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN DUPLICATE 2
ACCESSION NUMBER: 1994:168766 HCAPLUS
DOCUMENT NUMBER: 120:168766
ENTRY DATE: Entered STN: 02 Apr 1994
TITLE: **Proton-exchange membrane regenerative fuel cells**
AUTHOR(S): Swette, Larry L.; LaConti, Anthony B.; McCatty, Stephen A.
CORPORATE SOURCE: Giner, Inc., Waltham, MA, 02154-4497, USA

SOURCE: Journal of Power Sources (1994), 47(3), 343-51
CODEN: JPSODZ; ISSN: 0378-7753
DOCUMENT TYPE: Journal
LANGUAGE: English
CLASSIFICATION: 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 72

ABSTRACT:
This paper will update the progress in developing electrocatalyst systems and electrode structures primarily for the **pos.** ***electrode*** of single-unit solid polymer **proton-** ***exchange*** **membrane (PEM) regenerative** ***fuel*** **cells.** The work was done with DuPont Nafion 117 in complete **fuel cells** (40 cm2 electrodes). The cells were operated alternately in **fuel cell** mode and electrolysis mode at 80°. In **fuel cell** mode, humidified hydrogen and oxygen were supplied at 207 kPa (30 psi); in electrolysis mode, water was pumped over the **pos.** ***electrode*** and the gases were evolved at ambient pressure. Cycling data will be presented for Pt-Ir catalysts and limited bifunctional data will be presented for Pt, Ir, Ru, Rh and NaxPt3O4 catalysts as well as for electrode structure variations.

SUPPL. TERM: **proton exchange membrane**
regenerative fuel cell

INDEX TERM: Electrolytic **cells**
(diaphragm, proton-exchange, **regenerative fuel cells** as, progress in development of)

INDEX TERM: Catalysts and Catalysis
(electrochem., for **proton-exchange membrane regenerative fuel cells**
)

INDEX TERM: Polyoxyalkylenes, uses
ROLE: USES (Uses)
(fluorine- and sulfo-contg., ionomers, electrolyte, **regenerative fuel cells** with)

INDEX TERM: Fluoropolymers
ROLE: USES (Uses)
(polyoxyalkylene-, sulfo-contg., ionomers, electrolyte, **regenerative fuel cells** with)

INDEX TERM: Ionomers
ROLE: USES (Uses)
(polyoxyalkylenes, fluorine- and sulfo-contg., electrolyte, **regenerative fuel cells** with)

INDEX TERM: **Fuel cells**
(**regenerative, proton-exchange membrane**, progress in development of)

INDEX TERM: 7439-88-5, Iridium, uses 7440-06-4, Platinum, uses
7440-16-6, Rhodium, uses 7440-18-8, Ruthenium, uses
142262-84-8, Platinum sodium oxide (Pt3Na0.76O4)
153633-95-5, Platinum sodium oxide (Pt3Na0.74O4)
153633-96-6, Platinum sodium oxide (Pt3Na0.77O4)
153633-97-7, Platinum sodium oxide (Pt3Na0.89O4)
ROLE: CAT (Catalyst use); USES (Uses)
(catalysts, for **cathodes** of
proton-exchange membrane

regenerative fuel cells
)
INDEX TERM: 66796-30-3, Nafion 117
ROLE: USES (Uses)
(electrolyte, **regenerative fuel cells** with)

L62 ANSWER 18 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN DUPLICATE 3
ACCESSION NUMBER: 1993:512802 HCAPLUS
DOCUMENT NUMBER: 119:112802
ENTRY DATE: Entered STN: 18 Sep 1993
TITLE: Water post-treatment without expendables - **proton exchange membrane** based electrolysis system
AUTHOR(S): Petrov, K. M.; Kaba, L. M.; Srinivasan, S.; Appleby, A. j.
CORPORATE SOURCE: Cent. Electrochem. Syst. Hydrogen Res., Texas A and M Univ. Syst., College Station, TX, 77843-3402, USA
SOURCE: International Journal of Hydrogen Energy (1993), 18(5), 377-82
CODEN: IJHEDX; ISSN: 0360-3199
DOCUMENT TYPE: Journal
LANGUAGE: English
CLASSIFICATION: 9-13 (Biochemical Methods)
Section cross-reference(s): 60

ABSTRACT:
An electrochem. reactor that utilizes a **proton exchange** ***membrane*** (**PEM**) as the electrolyte is demonstrated for removal of org. and bacterial contaminants from reclaimed water. Electrochem. oxidn. of org. compds. was done using the following procedures: (1) potentiostatic control of the **anode** below the potential for oxygen evolution at room temp.; (2) galvanostatic control of the **anode** in the region of oxygen evolution at room temp.; and (3) use of a regenerative electrochem. unit, i.e., a water electrolyte/**fuel cell** (water electrolyzer/ ***fuel*** **cell**) operating in the electrolysis mode at 90°. The rates of oxidn. of the org. compds. and their current efficiencies were estd. The oxidn. of the org. compds. was quite effective in the **regenerative fuel cell** (water electrolyzer/**fuel cell**) when operated in electrolyzer mode, thus indicating that the same electrochem. system can be used for three functions in space stations and space vehicles: hydrogen and oxygen prodn., electricity generation and oxidative removal of org. compds. and bacterial species from reclaimed water.

SUPPL. TERM: water treatment **proton exchange membrane** electrolysis; reclamation water **proton exchange membrane** space
INDEX TERM: Bacteria
(electrooxidn. of, from reclaimed water, **proton exchange membrane** -based electrolysis system for, space vehicle in relation to)
INDEX TERM: Organic compounds, miscellaneous
ROLE: MSC (Miscellaneous)
(electrooxidn. of, from reclaimed water, **proton exchange membrane** -based electrolysis system for, space vehicle in relation to)
INDEX TERM: Electricity

(generation of, in **proton exchange membrane**-based electrolysis system for electrooxidn. of org. compds. and bacterial contaminants in reclaimed water, space vehicle in relation to)

INDEX TERM: Electrolytic cells
(in electrolysis system for electrooxidn. of org. compds. and bacteria from reclaimed water, space vehicle in relation to)

INDEX TERM: Space vehicles
(**proton exchange membrane**-based electrolysis system for electrooxidn. of org. compds. and bacterial contaminants in reclaimed water in relation to)

INDEX TERM: Cation exchangers
(membranes, proton exchange, in electrolysis system for electrooxidn. of org. compds. and bacteria from reclaimed water, space vehicle in relation to)

INDEX TERM: Wastewater treatment
(oxidn., electrochem., of org. compds. in reclaimed water, space vehicle in relation to)

INDEX TERM: Water purification
(reclamation, **proton exchange membrane**-based electrolysis system for, electrooxidn. of org. compds. and bacterial contaminants in, space vehicle in relation to)

INDEX TERM: Space vehicles
(space stations, **proton exchange membrane**-based electrolysis system for electrooxidn. of org. compds. and bacterial contaminants in reclaimed water in relation to)

INDEX TERM: 1332-29-2, Tin oxide
ROLE: ANST (Analytical study)
(**anode**, electrooxidn. of org. compds. in reclaimed water at, space vehicle in relation to)

INDEX TERM: 1333-74-0P, Hydrogen, miscellaneous 7782-44-7P, Oxygen, miscellaneous
ROLE: PREP (Preparation)
(prodn. of, in **proton exchange membrane**-based electrolysis system for electrooxidn. of org. compds. and bacterial contaminants in reclaimed water, space vehicle in relation to)

L62 ANSWER 19 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1995:612564 HCAPLUS
DOCUMENT NUMBER: 123:118347
ENTRY DATE: Entered STN: 15 Jun 1995
TITLE: **PEM regenerative fuel cells**
AUTHOR(S): Swette, Larry L.; LaConti, Anthony B.; McCatty, Stephen A.
CORPORATE SOURCE: Giner, Inc., Waltham, MA, 02154-4497, USA
SOURCE: NASA Conference Publication (1993), 3228, 139-48
CODEN: NACPDX; ISSN: 0191-7811
DOCUMENT TYPE: Journal
LANGUAGE: English
CLASSIFICATION: 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ABSTRACT:
This paper will update the progress in developing electrocatalyst systems and electrode structures primarily for the **pos.**

electrode of single-unit solid polymer **proton**
exchange **membrane (PEM) regenerative**
fuel **cells.** The work was done with DuPont Nafion 117
in complete **fuel cells** (40 cm2 electrodes). The
cells were operated alternately in **fuel cell** mode and
electrolysis mode at 80°. In **fuel cell** mode,
humidified H and O were supplied at 207 kPa; in electrolysis mode, water
was pumped over the **pos. electrode** and the gases were
evolved at ambient pressure. Cycling data will be presented for Pt-Ir
catalysts and limited bifunctional data will be presented for Pt, Ir, Ru,
Rh and NaxPt3O4 catalysts as well as for electrode structure variations.

SUPPL. TERM: **proton exchange membrane fuel cell; regenerative fuel cell PEM**

INDEX TERM: **Fuel cells**
(progress update of electrocatalytic system for **proton exchange membrane regenerative fuel cells**)

INDEX TERM: 7439-88-5, Iridium, uses 7440-06-4, Platinum, uses
ROLE: CAT (Catalyst use); DEV (Device component use); USES (Uses)
(Pt-Ir **fuel cell** catalyst;
progress update of electrocatalytic system for **proton exchange membrane regenerative fuel cells**)

L62 ANSWER 20 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1995:612563 HCAPLUS
DOCUMENT NUMBER: 123:61223
ENTRY DATE: Entered STN: 15 Jun 1995
TITLE: Primary and secondary electrical space power based on advanced **PEM** systems
AUTHOR(S): Vanderborgh, N. E.; Hedstrom, J. C.; Stroh, K. R.; Huff, J. R.
CORPORATE SOURCE: Advanced Engineering Technology Group, Los Alamos National Laboratory, Los Alamos, NM, 87545, USA
SOURCE: NASA Conference Publication (1993), 3228, 129-37
CODEN: NACPDX; ISSN: 0191-7811
DOCUMENT TYPE: Journal
LANGUAGE: English
CLASSIFICATION: 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ABSTRACT:
The series integrated annular module **proton exchange**
membrane **(PEM)** H-O **regenerative fuel**
cell system consists of: (1) a **fuel cell**
subsystem consisting of several annular **PEM** modules, the
anode and **cathode** flow-field layers, the **anode**
feed plenum, and gasketing, (2) a H delivery system consisting of a
high-performance compressed gas storage tank with a shut-off valve,
pressure regulation, a safety valve, a valved fill port, and an
anode -flow-field purge valve, (3) an O delivery system, (3) an
electrolyzer system, (4) an electronic package, (5) mech. supports, and
(6) a heat rejection radiator or connection with an integrated thermal
management system. We believ3e that the development of the annular
modular configuration described above could lead to a system that
exhibits the necessary and desirable characteristics for application to a
variety of space or planetary missions.

SUPPL. TERM: **proton exchange membrane regenerative fuel cell**; spacecraft power **regenerative fuel cell**; safety **regenerative fuel cell**

INDEX TERM: Polyoxyalkylenes, uses
ROLE: DEV (Device component use); USES (Uses)
(fluorine- and sulfo-contg., ionomers, primary and secondary elec. space power based on advanced **proton exchange membrane** systems)

INDEX TERM: Polyoxyalkylenes, uses
ROLE: DEV (Device component use); USES (Uses)
(fluorine-contg., sulfo-contg., ionomers; primary and secondary elec. space power based on advanced **proton exchange membrane** systems)

INDEX TERM: Fluoropolymers
ROLE: DEV (Device component use); USES (Uses)
(polyoxyalkylene-, sulfo-contg., ionomers; primary and secondary elec. space power based on advanced **proton exchange membrane** systems)

INDEX TERM: Fluoropolymers
ROLE: DEV (Device component use); USES (Uses)
(polyoxyalkylene-, sulfo-contg., ionomers, primary and secondary elec. space power based on advanced **proton exchange membrane** systems)

INDEX TERM: Ionomers
ROLE: DEV (Device component use); USES (Uses)
(polyoxyalkylenes, fluorine- and sulfo-contg., primary and secondary elec. space power based on advanced **proton exchange membrane** systems)

INDEX TERM: **Fuel cells**
(**regenerative**, primary and secondary elec. space power based on advanced **proton exchange membrane** systems)

INDEX TERM: 66796-30-3, Nafion 117
ROLE: DEV (Device component use); USES (Uses)
(primary and secondary elec. space power based on advanced **proton exchange membrane** systems)

L62 ANSWER 21 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1994:11694 HCAPLUS
DOCUMENT NUMBER: 120:11694
ENTRY DATE: Entered STN: 08 Jan 1994
TITLE: Development of single-unit acid and alkaline **regenerative** solid ionomer **fuel cells**
AUTHOR(S): Swette, Larry; Kosek, John A.; Cropley, Cecelia C.; LaConti, Anthony B.
CORPORATE SOURCE: Giner, Inc., Waltham, MA, 02154-4497, USA
SOURCE: Proceedings of the Intersociety Energy Conversion Engineering Conference (1993), 28th(Vol. 1), 1.1227-1.1232
CODEN: PIECDE; ISSN: 0146-955X
DOCUMENT TYPE: Journal
LANGUAGE: English

CLASSIFICATION: 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ABSTRACT:
Preliminary development of single-unit **regenerative** ***fuel*** **cells** that contain efficient bifunctional oxygen catalyst structures in intimate contact with proton- or alternatively, hydroxide-ion-exchange solid ionomer membranes was conducted. Dual-layer electrode structures, consisting of a catalyst layer optimized for gas evolution bonded to the ionomer membrane backed by a free standing electrode optimized for gas consumption had bifunctional performance superior to that of baseline electrode structures. Promising oxygen-evolution and bifunctional oxygen catalysts were identified. The ***regenerative*** **fuel cell** efficiency of both the proton- and hydroxide-ion-exchange membranes was high, with higher performance demonstrated by the **proton-exchange** ***membrane.***

SUPPL. TERM: **fuel cell regenerative**
solid ionomer membrane; electrode oxygen redn catalyst
fuel cell

INDEX TERM: **Anodes**
(**fuel-cell**, catalytic, for single-unit acid and alk. **regenerative** solid ionomer **cells**)

INDEX TERM: **Cathodes**
(**fuel-cell**, for single-unit acid and alk. **regenerative** solid ionomer **cells**)

INDEX TERM: **Fuel cells**
(**regenerative**, acid and alk. solid ionomer, single unit)

INDEX TERM: 7440-06-4, Platinum, uses 11113-84-1, Ruthenium oxide 12645-46-4, Iridium oxide 50958-14-0, Platinum sodium oxide
ROLE: CAT (Catalyst use); USES (Uses)
(catalyst, for electrodes, for single-unit acid and alk. **regenerative** solid ionomer **fuel cells**)

INDEX TERM: 66796-30-3, Nafion 117 123584-83-8, Raipore R 4030 127362-30-5, Tosflex IESF 34
ROLE: USES (Uses)
(electrolyte, for single-unit **regenerative** **fuel cells**)

INDEX TERM: 7782-44-7, Oxygen, reactions
ROLE: RCT (Reactant); RACT (Reactant or reagent)
(redn. of, catalysts for , for single-unit acid and alk. **regenerative** solid ionomer **fuel cells**)

L62 ANSWER 22 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN DUPLICATE 4

ACCESSION NUMBER: 1992:654802 HCAPLUS
DOCUMENT NUMBER: 117:254802
ENTRY DATE: Entered STN: 26 Dec 1992
TITLE: **Regenerative fuel cells**
AUTHOR(S): Swette, Larry L.; Kackley, Nancy D.; LaConti, Anthony B.
CORPORATE SOURCE: Giner, Inc., Waltham, MA, 02154, USA
SOURCE: Proceedings of the Intersociety Energy Conversion Engineering Conference (1992), 27th(Vol. 1), 1.101-1.106
CODEN: PIECDE; ISSN: 0146-955X

DOCUMENT TYPE: Journal
LANGUAGE: English
CLASSIFICATION: 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72

ABSTRACT:
Development is described of electrocatalysts based on Pt, Ir, Rh, and NaxPt3O4 and supports for **cathodes** of moderate-temp., single-unit, **regenerative fuel cells** (electrolysis **cell/fuel cell**). Alk. and solid polymer **proton-exchange membrane** (***PEM***) electrolytes were also evaluated for the O electrode. In alk. electrolyte, testing was performed on a half-cell with a floating-electrode cell. With solid polymer electrolytes, testing was performed with complete **PEM fuel cells** using Nafion 117. In 30% KOH at 80° and 200 mA/cm2, bifunctional Pt/RhO2 cells showed O redn. potential (Vo) of 0.875 V and O evolution potential (Ve) of 1.438 V (vs. H); for NaxPt3O4, Vo was 0.868 V and Ve was 1.444 V (vs. H). For the **PEM** cell at 90°, the bifunctional performance (internal resistance included) at 500 mA/cm2 obsd. for Pt/Pt-IrO2 is 0.723 V in **fuel-cell** mode and 1.587 V in electrolysis; and for Pt/Pt-NaxPt3O4, 0.740 V in **fuel -cell** mode and 1.697 V in electrolysis.

SUPPL. TERM: catalyst bifunctional platinum rhodium oxide; **cathode** catalyst oxygen redn formation; sodium platinum oxide bifunctional catalyst; **fuel cell cathode** bifunctional catalyst; electrolysis **regenerative fuel cell** catalyst

INDEX TERM: Electrolytic cells
(bifunctional noble metal-based materials for, for **regenerative fuel cells**)

INDEX TERM: Reduction catalysts
(electrochem., platinum and platinum sodium oxide, for oxygen, for bifunctional **fuel cell cathodes**)

INDEX TERM: Polyoxyalkylenes, uses
ROLE: USES (Uses)
(fluorine- and sulfo-contg., ionomers, electrolyte, bifunctional catalyst activity in, for **regenerative fuel cell cathode**)

INDEX TERM: **Cathodes**
(**fuel-cell**, bifunctional noble metal-based materials for, for **regenerative fuel cells**)

INDEX TERM: Fluoropolymers
ROLE: USES (Uses)
(polyoxyalkylene-, sulfo-contg., ionomers, electrolyte, bifunctional catalyst activity in, for **regenerative fuel cell cathode**)

INDEX TERM: 12030-49-8, Iridium oxide (IrO2) 12137-27-8, Rhodium oxide (RhO2)
ROLE: USES (Uses)
(catalyst of platinum on, for oxygen redn. and evolution, in bifunctional **cathode** for **fuel cell**)

INDEX TERM: 50958-14-0, Platinum sodium oxide
ROLE: CAT (Catalyst use); USES (Uses)

(catalyst, for oxygen redn. and evolution, in bifunctional **cathode** for **fuel cell**)

INDEX TERM: 7440-06-4P, Platinum, uses 7440-16-6P, Rhodium, uses 7440-57-5P, Gold, uses
ROLE: CAT (Catalyst use); PREP (Preparation); USES (Uses)
(catalyst, on rhodium oxide, for oxygen redn. and evolution, in bifunctional **cathode** for **fuel cell**)

INDEX TERM: 1310-58-3, Potassium hydroxide, uses
ROLE: USES (Uses)
(electrolyte , bifunctional catalyst activity in, for **regenerative fuel cell cathode**)

INDEX TERM: 66796-30-3, Nafion 117
ROLE: USES (Uses)
(electrolyte, bifunctional catalyst activity in, for **regenerative fuel cell cathode**)

INDEX TERM: 7782-44-7P, Oxygen, reactions
ROLE: RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)
(redn. and evolution of, bifunctional platinum catalyst for, for **fuel cell cathode**)

L62 ANSWER 23 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1993:9224 HCAPLUS
DOCUMENT NUMBER: 118:9224
ENTRY DATE: Entered STN: 10 Jan 1993
TITLE: Long life **regenerative fuel cell** technology development plan
AUTHOR(S): Littman, Franklin D.; Cataldo, Robert L.; McElroy, James F.; Stedman, Jay K.
CORPORATE SOURCE: Rockwell Int., Thousand Oaks, CA, 91358, USA
SOURCE: Proceedings of the Intersociety Energy Conversion Engineering Conference (1992), 27th(Vol. 1), 1.95-1.100
CODEN: PIECDE; ISSN: 0146-955X
DOCUMENT TYPE: Journal; General Review
LANGUAGE: English
CLASSIFICATION: 52-0 (Electrochemical, Radiational, and Thermal Energy Technology)

ABSTRACT:
A review with 13 refs. on technol. plans for development of a ***proton*** **exchange membrane regenerative** ***fuel*** **cell** for long life (20,000 h at 50% duty cycle) mobile or portable power system applications on the surface of the Moon and Mars. Module design; development of a ground engineering system, qualification unit, and flight unit; and schedule are discussed.

SUPPL. TERM: review **fuel cell** technol spacecraft

INDEX TERM: **Fuel cells**
(**proton-exchange-membrane, regenerative,** development of, for spacecraft)

L62 ANSWER 24 OF 34 COMPENDEX COPYRIGHT 2006 EEI on STN
ACCESSION NUMBER: 1993(1):11537 COMPENDEX
DOCUMENT NUMBER: 93015056

TITLE: **Regenerative fuel cells.**

AUTHOR: Swette, Larry L. (Giner, Inc); Kackley, Nancy D.; LaConti, Anthony B.

MEETING TITLE: Proceedings of the 27th Intersociety Energy Conversion Engineering Conference.

MEETING LOCATION: San Diego, CA, USA

MEETING DATE: 03 Aug 1992-07 Aug 1992

SOURCE: Aerospace Power Proceedings of the Intersociety Energy Conversion Engineering Conference v 1.Publ by IEEE, IEEE Service Center, Piscataway, NJ, USA, 929087.p 1.101-1.106
CODEN: PIECDE ISSN: 0146-955X
ISBN: 1-56091-264-2

PUBLICATION YEAR: 1992

MEETING NUMBER: 17321

DOCUMENT TYPE: Conference Article

TREATMENT CODE: Experimental; Application

LANGUAGE: English

ABSTRACT: The primary objective of this program is to define and develop electrocatalyst and supports for the **positive electrode** of moderate-temperature, single-unit, **regenerative fuel cells.**Both alkaline and solid polymer **proton-exchange membrane** (**PEM**) electrolytes have been investigated, with emphasis on the oxygen electrode in both systems.In alkaline electrolyte, the testing has been performed primarily on a half-cell basis with a floating-electrode cell.With solid polymer electrolytes, testing has been performed primarily with complete **PEM fuel cells** using duPont Nafion 117.Results are presented primarily for Pt, Ir, Rh and NaxPt3O4 catalysts.In 30% KOH at 80 degree C the bifunctional performance (iR free) at 200 mA/cm2 observed for Pt/RhO2 is 0.875 V in O2 reduction and 1.438 V in O2 evolution (vs.RHE); and for NaxPt3O4, 0.868 V in O2 reduction and 1.444 V in O2 evolution (vs.RHE).For the **PEM** cell at 80 degree C, the bifunctional performance (iR included) at 500 mA/cm2 observed for Pt/Pt-IrO2 is 0.723 V in **fuel-cell** mode and 1.587 V in electrolysis; and for Pt/Pt-NaxPt3O4, 0.740 V in **fuel-cell** mode and 1.697 V in electrolysis.(Author abstract) 6 Refs.

CLASSIFICATION CODE: 702 Electric Batteries & Fuel Cells; 815 Plastics & Polymeric Materials; 817 Plastics, Products & Applications

CONTROLLED TERM: ***FUEL CELLS**; POLYMERS; PROTONS; ELECTROLYTES

SUPPLEMENTARY TERM: **REGENERATIVE FUEL CELLS**; **PROTON EXCHANGE MEMBRANE**; POLYMER ELECTROLYTES

ELEMENT TERM: Pt; Ir; Rh; Na*O*Pt; Na sy 3; sy 3; O sy 3; Pt sy 3; NaxPt3O4; Na cp; cp; Pt cp; O cp; H*K*O; KOH; K cp; H cp; C; O*Rh; RhO2; Rh cp; O2; Ir*O*Pt; Ir sy 3; IrO2; Ir cp; Pt-IrO2; Pt-NaxPt3O4

L62 ANSWER 25 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1992:574980 HCAPLUS
DOCUMENT NUMBER: 117:174980
ENTRY DATE: Entered STN: 01 Nov 1992
TITLE: A photovoltaic-hydrogen-**fuel cell** energy system: preliminary operational results
AUTHOR(S): Lehman, P. A.; Chamberlin, C. E.
CORPORATE SOURCE: Environ. Resourc. Eng. Dep., Humboldt State Univ., Arcata, CA, 95521, USA
SOURCE: E. C. Photovoltaic Sol. Energy Conf., Proc. Int. Conf., 10th (1991), 708-11. Editor(s): Luque, Antonio. Kluwer: Dordrecht, Neth.
CODEN: 57SCA6
DOCUMENT TYPE: Conference
LANGUAGE: English
CLASSIFICATION: 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 49, 72

ABSTRACT:
A photovoltaic (PV) energy system which uses H as the storage medium and a **fuel cell** as the **regeneration** technol.
The system consists of a 9.2 kW PV array coupled to a high-pressure, bipolar, alk. electrolyzer. The arrays power an air compressor whenever possible; excess power is shunted to the electrolyzer for H and O prodn. When the array cannot provide sufficient power, stored H and O are furnished to a **proton exchange membrane**
fuel **cell** which, smoothly and without interruption, supplies the load. Modifications made to the electrolyzer to accommodate O-collection and the monitoring and control systems are described.

SUPPL. TERM: solar cell electrolysis hydrogen **fuel cell**; hydrogen prodn storage electrolysis; **fuel cell** hydrogen
INDEX TERM: Photoelectric devices, solar
(electrolysis-hydrogen storage-**fuel cell** system combination with)
INDEX TERM: Electrolytic cells
(solar cell and hydrogen storage and **fuel cell** combination with)
INDEX TERM: **Fuel cells**
(solar cells and electrolysis and hydrogen storage combination with)
INDEX TERM: 1333-74-0P, Hydrogen, preparation
ROLE: PREP (Preparation)
(prepn. and storage and fuel application of, in solar cell-electrolysis-**fuel cell** system)
INDEX TERM: 7782-44-7P, Oxygen, preparation
ROLE: PREP (Preparation)
(prepn. and storage and use of, in solar cell-electrolysis-**fuel cell** system)

L62 ANSWER 26 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1993:84342 HCAPLUS
DOCUMENT NUMBER: 118:84342
ENTRY DATE: Entered STN: 02 Mar 1993
TITLE: Development of a solid polymer electrolyte **regenerative fuel cell**
AUTHOR(S): Andolfatto, F.; Durand, R.; Eybert-Berard, A.;

Stevens, P.; Alleau, T.
CORPORATE SOURCE: LASP, Commis. Energ. At., Grenoble, 38041, Fr.
SOURCE: European Space Agency, [Special Publication], SP (1991), ESA SP-320(Proc. Eur. Space Power Conf., 1991, Vol. 1), 473-7
CODEN: ESPUD4; ISSN: 0379-6566
DOCUMENT TYPE: Journal
LANGUAGE: English
CLASSIFICATION: 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72

ABSTRACT:
Some of the problems inherent in running a mini-pilot scale polymer exchange membrane (**PEM**) based water electrolyzer have been analyzed and treated. Some of these are inherent in the use of a solid polymer electrolyte and its ion exchange properties. The use of IrO2 electrocatalyst on a porous Ti electrode is described. The mechanism of the H evolution reaction on IrO2 is analyzed.

SUPPL. TERM: **fuel cell** polymer electrolyte **regenerative**; water electrolyzer polymer exchange membrane

INDEX TERM: Electrolysis catalysts
(iridium dioxide, for polymer exchange membrane water electrolyzer, for **regenerative fuel cells**)

INDEX TERM: Electrolytic cells
(diaphragm, ion-exchanging, for water, for **regenerative fuel cells**
)

INDEX TERM: **Fuel cells**
(**regenerative**, polymer exchange membrane, water electrolyzer for)

INDEX TERM: **Fuel cells**
(solid-state, polymer exchange membrane, water electrolyzer for)

INDEX TERM: 12030-49-8, Iridium dioxide
ROLE: CAT (Catalyst use); USES (Uses)
(catalyst, for polymer exchange membrane water electrolyzer, for **regenerative fuel cells**)

INDEX TERM: 7440-32-6, Titanium, uses
ROLE: USES (Uses)
(electrode, iridium oxide-catalyzed, for polymer exchange membrane water electrolyzer, for **regenerative fuel cells**
)

INDEX TERM: 7732-18-5, Water, reactions
ROLE: RCT (Reactant); RACT (Reactant or reagent)
(electrolyzer for, polymer exchange membrane, for **regenerative fuel cells**
)

INDEX TERM: 66796-30-3, Nafion 117
ROLE: USES (Uses)
(ion exchange membrane, water electrolyzer with, for **regenerative fuel cells**)

INDEX TERM: 1333-74-0P, Hydrogen, preparation 7782-44-7P, Oxygen, preparation
ROLE: PREP (Preparation)
(prepn. of, water electrolyzer for, polymer exchange membrane, for **regenerative**

fuel cells)

L62 ANSWER 27 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1993:172438 HCAPLUS
DOCUMENT NUMBER: 118:172438
ENTRY DATE: Entered STN: 01 May 1993
TITLE: Electrochemical energy storage using **PEM** systems
AUTHOR(S): Vanderborgh, N. E.; Hedstrom, J. C.; Huff, J. R.
CORPORATE SOURCE: Adv. Eng. Technol. Group, Los Alamos Natl. Lab., Los Alamos, NM, 87545, USA
SOURCE: European Space Agency, [Special Publication], SP (1991), ESA SP-320(Proc. Eur. Space Power Conf., 1991, Vol. 1), 467-71
CODEN: ESPUD4; ISSN: 0379-6566
DOCUMENT TYPE: Journal
LANGUAGE: English
CLASSIFICATION: 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ABSTRACT:
This paper gives results of an engineering assessment for future, long-lived space power systems for extraterrestrial applications. Solar-based, **regenerative fuel cell** power plants formed from either alk. or **PEM** (**proton** ***exchange*** **membrane**) components are the focus. Test results on advanced **PEM fuel cell** stack components are presented.

SUPPL. TERM: **fuel cell proton exchange membrane**; **regenerative fuel cell** space
INDEX TERM: **Fuel cells**
(alk., for solar-based **regenerative** power sources for space applications)
INDEX TERM: Polyoxyalkylenes, uses
ROLE: USES (Uses)
(fluorine- and sulfo-contg., ionomers, **fuel cells** with, for solar-based **regenerative** space applications)
INDEX TERM: Fluoropolymers
ROLE: USES (Uses)
(polyoxyalkylene-, sulfo-contg., ionomers, **fuel cells** with, for solar-based **regenerative** space applications)
INDEX TERM: Ionomers
ROLE: USES (Uses)
(polyoxyalkylenes, fluorine- and sulfo-contg., **fuel cells** with, for solar-based **regenerative** space applications)
INDEX TERM: **Fuel cells**
(**regenerative**, **proton exchange membrane**, for solar-based applications)
INDEX TERM: 1310-58-3, Potassium hydroxide, uses
ROLE: USES (Uses)
(electrolyte, **fuel cells** with, for solar-based **regenerative** space systems)
INDEX TERM: 66796-30-3, Nafion 117
ROLE: USES (Uses)
(**fuel cells** with, for

solar-based **regenerative** space
applications)

L62 ANSWER 28 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1991:453375 HCAPLUS
DOCUMENT NUMBER: 115:53375
ENTRY DATE: Entered STN: 10 Aug 1991
TITLE: Design of a photovoltaic-hydrogen-**fuel cell** energy system
AUTHOR(S): Lehman, P. A.; Chamberlin, C. E.
CORPORATE SOURCE: Dep. Environ. Resour. Eng., Humboldt State Univ., Arcata, CA, 95521, USA
SOURCE: International Journal of Hydrogen Energy (1991), 16(5), 349-52
CODEN: IJHEDX; ISSN: 0360-3199
DOCUMENT TYPE: Journal
LANGUAGE: English
CLASSIFICATION: 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72

ABSTRACT:
The design of a stand-alone renewable energy system using H as the energy storage medium and a **fuel cell** as the ***regeneration*** technol. is reported. The system being installed at the Humboldt State University Telonicher Marine Lab. consists of a 9.2 kW photovoltaic array coupled to a high pressure, bipolar alk. electrolyzer. The array powers the lab. air compressor system whenever possible; excess power is shunted to the electrolyzer for H and O prodn. When the array cannot provide sufficient power, stored H and O are furnished to a ***proton*** **exchange membrane fuel** ***cell*** which, smoothly and without interruption, supplies the load. Details of component selection, sizing, and integration, control system logic and implementation, and safety considerations are described. Plans for a monitoring network to monitor system performance are presented, questions that will be addressed through the monitoring program are included, and the present status of the project is reported.

SUPPL. TERM: photovoltaic hydrogen **fuel cell** energy system; safety photovoltaic **fuel cell** system
INDEX TERM: Photoelectric devices, solar
(array of, high pressure bipolar electrolyzer and **proton exchange membrane fuel cell** in combination with, design of)
INDEX TERM: **Fuel cells**
(hydrogen-oxygen, photovoltaic array and high pressure bipolar electrolyzer in combination with, design of)
INDEX TERM: Safety
(of photovoltaic-hydrogen-**fuel cell** energy system)
INDEX TERM: Electrolytic cells
(bipolar, high-pressure, photovoltaic array and **proton exchange membrane fuel cell** in combination with, design of)
INDEX TERM: 1333-74-0, Hydrogen, uses and miscellaneous
ROLE: USES (Uses)
(storage of, photovoltaic-**fuel cell** energy system with, design of)

L62 ANSWER 29 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1992:637107 HCAPLUS
DOCUMENT NUMBER: 117:237107
ENTRY DATE: Entered STN: 13 Dec 1992
TITLE: **Regenerative fuel cell** architectures for lunar surface power
AUTHOR(S): Harris, D. W.; Gill, S. P.; Nguyen, T. M.; Vrolyk, J. J.
CORPORATE SOURCE: Rocketdyne Div., Rockwell Int., Canoga Park, CA, 91303, USA
SOURCE: NASA Conference Publication (1991), 3125(Space Electrochem. Res. Technol.), 147-54
CODEN: NACPDX; ISSN: 0191-7811
DOCUMENT TYPE: Journal
LANGUAGE: English
CLASSIFICATION: 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ABSTRACT:
Various RFC (**regenerative fuel cell**) configurations for stationary lunar missions were examd. using a computer model. For stationary applications, a GaAs/Ge photovoltaic (PV) array with a 3000 psi gas storage **proton exchange** ***membrane*** (**PEM**) RFC providing 25 kW during the day and 12.5 kW at night was designed. PV/RFC systems utilizing super-crit. H/O storage and cryogenic H/O storage for the RFCs were compared with the baseline high pressure gas storage RFC system. For long duration nighttime operation missions the super-crit. H/O storage RFC systems offer >20% mass advantage over the high pressure gas storage while the mass savings for the cryogenic H/O storage RFC systems can be as high as 30%.

SUPPL. TERM: power source lunar mission; solar **regeneration fuel cell** combination; hydrogen storage **regenerative fuel cell**
INDEX TERM: Photoelectric devices, solar
(gallium arsenide-germanium, modeling of)
INDEX TERM: **Fuel cells**
(**regenerative**, hydrogen, solar **cell** combination with, modeling of)
INDEX TERM: 1333-74-0, Hydrogen, uses
ROLE: USES (Uses)
(fuel, for **regenerative fuel cells**, stationary lunar mission operation of, modeling of)
INDEX TERM: 7440-56-4, Germanium, uses
ROLE: USES (Uses)
(photoelec. solar **cells** of gallium arsenide and, **regenerative fuel cell** with, performance modeling of)
INDEX TERM: 1303-00-0, Gallium arsenide, uses
ROLE: USES (Uses)
(photoelec. solar **cells** of germanium and, **regenerative fuel cell** with, performance modeling of)

L62 ANSWER 30 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1990:220251 HCAPLUS
DOCUMENT NUMBER: 112:220251
ENTRY DATE: Entered STN: 09 Jun 1990
TITLE: Hydrogen-oxygen **proton-**

exchange membrane fuel
cells and electrolyzers

AUTHOR(S): Baldwin, R.; Pham, M.; Leonida, A.; McElroy, J.; Nalette, T.
CORPORATE SOURCE: Lewis Res. Cent., NASA, Cleveland, OH, 44135, USA
SOURCE: Journal of Power Sources (1990), 29(3-4), 399-412
CODEN: JPSODZ; ISSN: 0378-7753
DOCUMENT TYPE: Journal; General Review
LANGUAGE: English
CLASSIFICATION: 52-0 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 72

ABSTRACT:
A review with 4 refs. on development and performance characteristics of H-O **fuel cell**-electrolyzer power systems. Perfluorocarbon **proton-exchange membrane** stability and F- loss rate, **fuel cell** voltage stabilization, operation requirements and approaches for ***regenerative*** **fuel cells** in spacecraft, and flight expt. plans are discussed.

SUPPL. TERM: review **fuel cell** electrolyzer spacecraft; perfluorinated membrane **fuel cell** review
INDEX TERM: Electrolytic cells
(hydrogen-oxygen **fuel cell** combined with, with fluoropolymer membrane electrolyte, for spacecraft)
INDEX TERM: Fluoropolymers
ROLE: USES (Uses)
(ionomers, sulfo-contg., electrolytes, **fuel cell**-electrolyzer system with, characteristics of, for spacecraft)
INDEX TERM: Ion exchangers
(membranes, sulfonated perfluoropolymers, **fuel cell**-electrolyzer system with, characteristics of, for spacecraft)
INDEX TERM: **Fuel cells**
(solid-electrolyte, hydrogen-oxygen, electrolyzer combined with, with fluoropolymer membrane electrolytes, for spacecraft)

L62 ANSWER 31 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1991:9555 HCAPLUS
DOCUMENT NUMBER: 114:9555
ENTRY DATE: Entered STN: 12 Jan 1991
TITLE: **Regenerative fuel cells** for space and terrestrial use
AUTHOR(S): Tillmetz, Werner; Dietrich, Guenther; Benz, Uwe
CORPORATE SOURCE: Dornier G.m.b.H., Friedrichshafen, 7990/1, Germany
SOURCE: Proceedings of the Intersociety Energy Conversion Engineering Conference (1990), 25th(Vol. 3), 154-8
CODEN: PIECDE; ISSN: 0146-955X
DOCUMENT TYPE: Journal; General Review
LANGUAGE: English
CLASSIFICATION: 52-0 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72

ABSTRACT:
A review with 6 refs. of RFCS (**regenerative fuel**
cell system) technologies (alk. with mobile and immobilized
electrolytes, **proton exchange membrane**,
mixed system), factors affecting RFCS operation, comparison of RFCS with
batteries, and terrestrial uses (peak load leveling, regenerative energy
sources, emergency unit).

SUPPL. TERM: review **regenerative fuel cell**; space **regenerative fuel cell** review; terrestrial **regenerative fuel cell** review

INDEX TERM: Electrolytic **cells**
(**regenerative fuel cells** combined with, technologies for, comparison of, for space and terrestrial uses)

INDEX TERM: **Fuel cells**
(**regenerative**, technologies for, comparison of, for space and terrestrial uses)

L62 ANSWER 32 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1990:9819 HCAPLUS
DOCUMENT NUMBER: 112:9819
ENTRY DATE: Entered STN: 06 Jan 1990
TITLE: European **regenerative fuel cell** technology for space use
AUTHOR(S): Baron, Francis; Philippi, Ralf; Tillmetz, Werner
CORPORATE SOURCE: ESTEC, Noordwijk, NL-2200, Neth.
SOURCE: Eur. Space Agency, [Spec. Publ.] ESA SP (1989), ESA SP-294, Vol. 1, Proc. Eur. Space Power Conf., 1989, 221-6
CODEN: ESPUD4; ISSN: 0379-6566
DOCUMENT TYPE: Report
LANGUAGE: English
CLASSIFICATION: 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ABSTRACT:
Regenerative fuel cells with immobile alk.
electrolyte (KOH), **proton exchange membrane**
(**PEM**), mixed systems (immobilized KOH and **PEM**), and
mobile alk. electrolyte (KOH), were evaluated, for energy storage and
supply in space. The immobile electrolyte **regenerative**
fuel **cells** have a high level of performance and
efficiency, low mass, and few expected problems for operation under
μ-gravity. At increasing power levels (>20 kW), the
regenerative **fuel cell** systems are more
attractive than batteries, in terms of capability for integration with
energy storage and life support and propulsion systems.

SUPPL. TERM: **fuel cell regenerative** technol spacecraft

INDEX TERM: Electrolytic **cells**
(diaphragm, proton-exchanging, **regenerative fuel cells** with, for spacecraft)

INDEX TERM: **Fuel cells**
(**regenerative**, with mobile and immobile alk. electrolytes and **proton exchange membrane**, comparison of, for spacecraft)

INDEX TERM: 1310-58-3, Potassium hydroxide, uses and miscellaneous
ROLE: USES (Uses)

(electrolytes, mobile and immobile,
regenerative fuel cells
with, for spacecraft)

L62 ANSWER 33 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1990:9775 HCAPLUS
DOCUMENT NUMBER: 112:9775
ENTRY DATE: Entered STN: 06 Jan 1990
TITLE: **Regenerative fuel cell** systems for Project Pathfinder
AUTHOR(S): Huff, J.; Hedstrom, J.; Vanderborgh, N.; Prokopius, P.
CORPORATE SOURCE: Los Alamos Natl. Lab., Los Alamos, NM, USA
SOURCE: Eur. Space Agency, [Spec. Publ.] ESA SP (1989), ESA SP-294, Vol. 1, Proc. Eur. Space Power Conf., 1989, 217-19
CODEN: ESPUD4; ISSN: 0379-6566
DOCUMENT TYPE: Report; General Review
LANGUAGE: English
CLASSIFICATION: 52-0 (Electrochemical, Radiational, and Thermal Energy Technology)

ABSTRACT:
A review, with 3 refs., of the surface power program of the exploration thrust of Project Pathfinder (a NASA project to develop crit. capabilities for the future of the civil space program), technol. assessment and study of **fuel cell** and electrolyzer technologies for **regenerative fuel cells**, and the viability of **proton-exchange membrane** ***fuel*** **cells.**

SUPPL. TERM: review **regenerative fuel cell** spacecraft
INDEX TERM: **Fuel cells**
(**regenerative**, technol. assessment of, for surface power, for Project Pathfinder of civil space program)

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ACCESSION NUMBER: 1991:539535 HCAPLUS
DOCUMENT NUMBER: 115:139535
ENTRY DATE: Entered STN: 05 Oct 1991
TITLE: Hydrogen-oxygen **proton-exchange membrane fuel cells** and electrolyzers
AUTHOR(S): Baldwin, R.; Pham, M.; Leonida, A.; McElroy, J.; Nalette, T.
CORPORATE SOURCE: Lewis Res. Cent., NASA, Cleveland, OH, 44135, USA
SOURCE: NASA Conference Publication (1989), 3056(Space Electrochem. Res. Technol. (SERT) 1989), 127-36
CODEN: NACPDX; ISSN: 0191-7811
DOCUMENT TYPE: Journal
LANGUAGE: English
CLASSIFICATION: 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 72

ABSTRACT:
The plan of a flight expt. is described, for evaluation in microgravity environment, of several ground proven features of solid polymer electrolyte **fuel cells** and electrolyzers. With a successful flight expt., supported by terrestrial expts., the system designer can select the features appropriate for extraterrestrial uses.

The ultimate cell life, cell voltage stability, extraterrestrial applications for H-O **fuel cells** and electrolyzers, system simplifications, and the flight expt. are discussed.

SUPPL. TERM: **fuel cell proton exchange membrane**; electrolyzer **proton exchange membrane**; polymer electrolyte **fuel cell** electrolyzer

INDEX TERM: Electrolytic cells
(diaphragm, proton-exchange, flight expt. for)

INDEX TERM: **Fuel cells**
(**regenerative**, hydrogen-oxygen **proton-exchange membrane**, flight expt. for)

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